MONTHLY WEATHER REVIEW.

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The MONTHLY WEATHER REVIEW is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by R. F. Stupart, Esq., Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Director Meteorological Office, London; Maxwell Hall, Esq., Government Meteorologist, Kingston, Jamaica; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian is used in the text of the MONTHLY WEATHER REVIEW.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea level and latitude 45°.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

IN GENERAL.

December usually marks the establishment of winter types of atmospheric pressure over the Northern Hemisphere. The great interior of Asia becomes the seat of the principal so-called permanent winter high area of the hemisphere, and a high pressure area builds up over the west interior of the North American Continent. Permanent winter low areas are formed over Bering Sea and Iceland. A seasonable distribution of the greater areas of high and low pressure gives to the Northern Hemisphere seasonable weather. Irregularities in the distribution and character of these areas result in types of unseasonable weather thruout the hemisphere.

In December, 1907, the winter distribution of pressure did not become well established over the Northern Hemisphere. In the Asiatic area the barometer was high during the second decade and fluctuated rapidly during the balance of the month. Over Bering Sea the barometer was lowest from the 17th to the 22d, and was abnormally high during a portion of the first decade and at the close of the month. Over the Hawaiian Islands the barometer was high from the 1st to 6th, 8th to 15th, 17th to 20th, 26th and 27th; on other dates it was below normal. In the Iceland area pressure continued low during the first two decades, and was relatively high after the 20th. Over the Azores pressure was high during the first half and generally low and fluctuating during the second half of the month. The irregularities presented reveal the associated causes of unseasonable types of weather experienced during the month.

In the United States the month was unusually mild and free from severe cold periods. Precipitation was in excess along the Atlantic and Gulf coasts, in parts of the Lake region, and in a belt extending from the lower Missouri Valley to the north Pacific coast; elsewhere it was deficient. The month opened with a period of fair, cool weather. From the 3d to the 7th a barometric depression occupied the north Pacific coast. Moving eastward over the central valleys and the Lake region during the 8th and 9th a disturbance reached the Atlantic coast on the 10th. The second storm period set in over the north Pacific coast on the 9th and continued until the 13th. The storm area extended over the Rocky Mountain districts from the 10th to the 14th, the central valleys and the Lake region from the 11th to the 15th, and the Atlantic coast States from the 14th to the 16th. Gales were severe on the north Pacific coast from the 10th to the 13th, and on the middle Atlantic and New England coasts on the 14th and 15th. On the latter-named dates heavy snow fell from the southern Lake region over New England. Following this disturbance there was a period, lasting about a week, of comparatively fine weather generally over the country. After the 20th weather changes were rapid. Pressure fluctuated on the north Pacific coast and toward the close of the month was low on the middle and south Pacific coasts. A storm of marked strength advanced eastward over the central valleys to the Atlantic coast from the 22d to the 24th, attended by heavy rain in the Eastern and Southeastern States, and by heavy snow in parts of the middle and north-central valleys. The month closed with a severe storm passing off the north Atlantic coast.

BOSTON FORECAST DISTRICT.*

[New England.]

The first week was colder and the balance of the month warmer than usual. Snowfall was confined to the first half of the month, the greatest fall being on the 14-15th. Severe storms occurred on the 14th, 23d, 27th, and 30-31st. Timely warnings of the storms resulted in the saving of much property, and doubtless were the means of saving numerous lives. There were no storms without warnings.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.*

[Louisiana, Texas, Oklahoma, and Arkansas.]

The month was warm and precipitation was unevenly distributed. No cold-wave or storm warnings were issued. Warnings issued for frost or freezing temperature were justified. No extensive storm occurred.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.*

[Kentucky and Tennessee.]

Temperature was slightly above normal, and precipitation was about normal and well distributed; a noticeable deficiency in precipitation occurred, however, in western Tennessee. Two storms in the third decade of the month were attended by heavy rain and high wind. No cold-wave or other special warnings were issued.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.*

[Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, and Montana.]

Mild temperatures prevailed and general cold-wave warnings were neither ordered nor required. No storms of a serious

character occurred. Precipitation was fairly well distributed. A heavy snowstorm occurred over the southern Lake region on the 14th. Snow warnings were issued on that date.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.*

[Wyoming, Colorado, Utah, New Mexico, and Arizona.]

Storms were fewer than usual. Precipitation was below, and temperature above normal. Low temperatures prevailed in southwestern Wyoming from the 16th to the 21st, and at high level stations in Colorado from the 17th to the 21st.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.†

[California and Nevada.]

Normal conditions prevailed. On the 4th, 10th, 19th, and 24th depressions appeared on the north Pacific coast that were attended by periods of unsettled weather, rain, and high winds. There were numerous frosts, most of which were forecast.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.†

[Oregon, Washington, and Idaho.]

December was an exceptionally stormy month. The most severe storm occurred on the 12th, when a barometer reading of 28.84 inches and a wind velocity of 96 miles an hour were registered at North Head, Wash. On the 23d a wind velocity of 82 miles was noted at Tatoosh Island, Wash. Storm warnings were ordered in advance of each gale and casualties were light.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

While there were no floods of great consequence during the month, there were a number of marked rises in the rivers of the Atlantic and Pacific States that were sufficient to make the month a fairly active one in those localities. The heavy rains of the 10th over New England and the Middle Atlantic States were followed by general rises in the rivers, but not to above flood stages, except in some of the Maine rivers.

In the Hudson and lower Mohawk rivers, however, the conditions were so threatening that it became necessary to issue an advisory warning that the flood stage would not quite be reached. This warning accomplished its purpose, and much expense that would otherwise have been unnecessarily incurred was saved.

The next rise in the rivers of the Atlantic States was caused by the heavy and general rains of the 14th, and flood stages were general in the rivers of the Carolinas. Warnings were issued on the 14th wherever necessary. The southwest storm of the 21st–23d was attended by heavy rains over the Atlantic States on the 22d and early morning of the 23d. Flood warnings were issued generally on that and the following day. This flood, like that of the middle of the month, was moderate in character and no damage of consequence was done.

Heavy rains in eastern Texas on the 21st and 22d filled the Sabine River to the bank-full stage and the Trinity River rose 4 or 5 feet above the flood stage from the 24th to the 30th. Warnings were issued on the 22d.

The heavy rains over the north Pacific coast States during the last decade of the month caused a flood in the Willamette Valley, with stages from 2 to 8 feet above the flood stage, the greatest excess occurring at Albany, Oreg. Warnings were first issued on the 23d and were repeated daily thereafter until the flood subsided. The crest stages reached agreed very nearly with those that had been forecast, and not much damage appears to have been caused by this flood. Rainfall chart and hydrographs for this flood are shown herewith. (See figs. 1 and 2.)

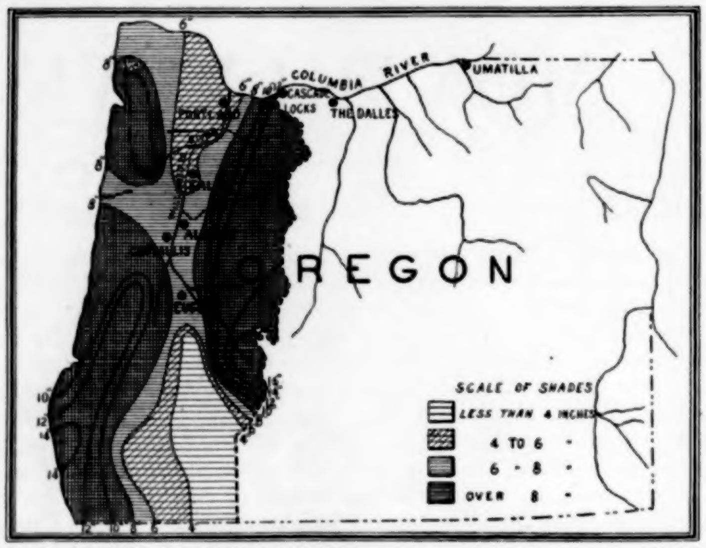


Fig. 1.—Precipitation in western Oregon from December 17 to 27, 1907, inclusive.

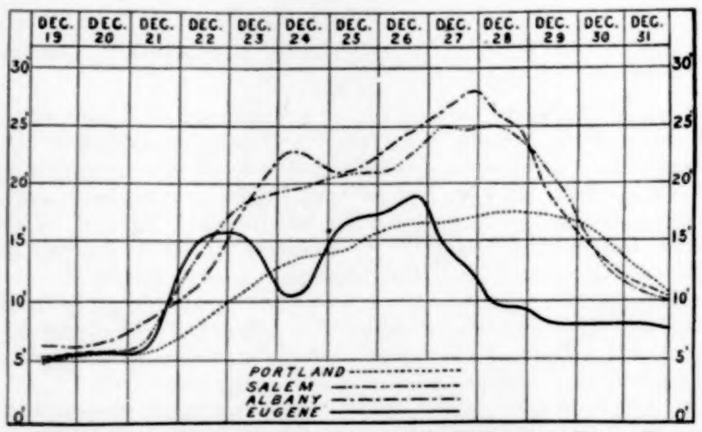


Fig. 2.—Hydrographs for four stations on the Willamette River, December 19 to 31, 1907, inclusive.

ICE.

At the end of the month the Missouri River was closed as far south as Pierre, S. Dak., where it froze over on the 21st. Navigation closed on the 1st, and at the end of the month there were 4 inches of solid ice, much less than at the end of December, 1906. Floating ice was observed as far south as Boonville, Mo., from the 19th to the 23d, inclusive. At Bismarck, N. Dak., the river froze over on the 3d, and navigation was closed.

The Mississippi River was closed as far south as Prairie du Chien, Wis., but remained open below, except at Leclaire, Iowa, where it closed on the 31st. The southern limit of floating ice was at Hannibal, Mo., where navigation was practically closed on the 1st, altho ice did not appear until the 18th. During December, 1906, ice was observed as far south as Cairo, Ill.

There was floating ice in the Allegheny River on numerous dates, but none was observed in the Ohio River below Coraopolis, Pa.

An ice gorge formed at the Douglas Avenue Bridge over the Arkansas River at Wichita, Kans., on the 19th, but it soon past out. The Kansas River was also closed above the bridge at Manhattan, Kans., from the 18th to the 26th, inclusive.

There was considerable ice in the rivers of New England and the Middle Atlantic States, but, as a rule, much less than during December, 1906. Navigation at Albany, N. Y., on the Hudson River, was closed on the 6th, when the river was filled with floating ice. The Connecticut River at Hartford,

* Morning forecasts made at district center; night forecasts made at Washington, D. C.

† Morning and night forecasts made at district center.

Conn., was open to the end of the month, the latest date since 1900.

SNOW.

Following is a very brief *résumé* of the snow bulletins issued in the various western States where the run-off from the melted snows is depended upon to supply water for irrigation purposes.

Arizona.—At the end of December there were rather less than 3 inches of snow in the mountains tributary to the Salt, Verde, Agua Fria, Hassayampa, and Little Colorado rivers, with none in the valleys. It is estimated that the run-off will last until March, 1908.

Colorado.—There was rather less than the usual amount of snow in the Rio Grande and other southern watersheds, and about the average amount over the northern watersheds. Later snows must be depended upon to furnish the water supply for irrigation purposes.

Idaho.—The amount of snowfall was somewhat above the average, altho of uneven distribution. As there was also considerable rain, the accumulated snow has become well solidified, insuring a high percentage of run-off.

Montana.—The snowfall was deficient, and at this time prospects of an abundant water supply are not favorable. This is in marked contrast to the conditions that existed during December, 1906, when there were several inches of well-packed snow on the ground.

Nevada.—The same conditions prevailed as in Montana. In the Humboldt Basin there were about 2 feet, and in the Truckee Basin about 5 feet of snow near the mountain summits. It is too early to make an accurate estimate of the water supply that will be available later, but more snow will be necessary for even a normal amount.

New Mexico.—The snowfall was comparatively light, but conditions, on the whole, are favorable for future water supply. The depth of snow in the mountains varies from 7 to 19 inches, with the maximum amount over the Rio Grande watershed.

Oregon.—The snowfall was deficient in quantity except over the higher altitudes in the extreme eastern portion of the State, where the depth is considerably greater than at the end of the year 1906.

Utah.—The snowfall was of average quantity, and the prospects of a sufficient water supply are favorable.

Washington.—The snowfall was somewhat deficient in quantity, but is quite compact owing to abundant rains and high temperatures.

Wyoming.—There is an abundant, compact snowfall as a rule, insuring, under normal conditions, a good supply of water for the coming summer, except over the eastern slope of the Big Horn Mountains.

The highest and lowest water, mean stage, and monthly range at 199 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

COMPREHENSIVE MAPS AND MODELS OF THE GLOBE FOR SPECIAL METEOROLOGICAL STUDIES.[1]

By Prof. CLEVELAND ABBE.

1. Maps in general.—Comprehensive maps of the globe for special meteorological work are needed in studying the general motions of the atmosphere as preparatory to long-range forecasts. Maps or charts that shall represent a large portion of the earth's surface are described in many treatises on chartography such as those of Gretschel, Schott, Craig, and others. Each method of charting results in a plane figure that represents some one feature of the spherical surface correctly, but is necessarily distorted as to other features.

2. Geometrical projections.—If a spherical surface is viewed from one fixt point and is thus directly projected on the retina or on a plane, we obtain the geometrical perspective methods of projection such as those known as the orthographic, the stereographic, or the gnomonic, all of which were known to the ancients, or the newer projections devised by James, Clarke, and others.

3. Geometric developments.—If the spherical surface is projected perspectively on the surface of a cylinder or cone tangent to some small circle of the sphere, or intersecting the sphere, or even wholly outside of the sphere, and if this surface be then unrolled or "developed" on a plane surface, we obtain a geometric development of the sphere as distinguished from a geometric projection, properly so called. Such are Mercator's projection, the conic, the polyconic, and Bonné's.

4. Analytical developments.—If special conditions are imposed as to the relative dimensions or distortions in different parts of the desired map, then the transfer from sphere to plane must in general be done by the help of analytical formulas and by computations rather than by the so-called geometric constructions; these we call analytical developments, as, for example, the equal-surface development of Lambert, or the minimum-distortion method of Gauss, or the "balance of errors" method by Airy.

5. Special cases.—Finally, there are some other methods of drawing maps, described at first as purely arbitrary methods, but eventually shown to be special cases of the methods previously mentioned. Such are Mercator's, the globular method of Nicolosi, and the polar projection described by both Postel and Werner independently, which has been used, for example, by the Weather Bureau since 1875 in the daily weather maps of the Daily Bulletin of International Simultaneous Observations, as also in the summary of these observations published in Bulletin A of the Weather Bureau.

6. Angular relations.—Maps like the Mercator and gnomonic, in which the angular relations on the spherical surface remain unchanged in the resulting maps, are specially favorable for plotting local wind directions and for studying the angles between winds and isobars.

7. Equal areas.—Maps that preserve a uniform ratio between all areas on the globe and the corresponding areas on the maps are the so-called equal-surface developments, and are appropriate for the study of areal statistics, such as the distribution of rainfall, the extent of high and low areas, the mass of air or moisture or evaporation, the average pressures or temperatures in special zones of the globe, the relations between insolation and temperature, the relative frequency of local storms over a given area, etc.

8. Equal distances.—Maps in which equal elementary distances on the sphere, both meridional and latitudinal, have corresponding equal equivalents on the map, are generally most appropriate for measuring the lengths of storm tracks, the movement of the wind in twenty-four hours, the intensity of the gradients of temperature and pressure. These include the polyconic projections, but for long distances the angular distortions are appreciable and the gnomonic projection must be used.

9. Value of polar projections in meteorology.—All methods of projection or development are of general application to the

[1] Read before the Association of American Geographers at its meeting in New York, N. Y., January 1, 1907. Revised February 5, 1908. The figures accompanying this article appear upon Plates I, II, III, and IV, at the end of this issue.

earth's surface, without regard to the position of the pole or the equator; but in some studies it is best to make the equator, or some special meridian, or some special small circle, prominent in the map, while in other cases it is necessary to make the North or South Pole the prominent feature. For special studies in dynamical meteorology, including the relation of solar radiation to the movements of the atmosphere, the polar projections of the whole of the Northern and Southern hemispheres are necessary and peculiarly convenient. For such purposes we may use the orthographic, the stereographic, the gnomonic, the arbitrary Postel-Werner, the equivalent or equal-area (of Lambert), the James, the Airy, or the Clarke projection. The special merits of each of these projections, when applied to polar maps, will be considered in detail in the following paragraphs.

The general graphic comparison of the construction and relative dimensions of various polar maps is given by the study of Plate II, where NES is a section of the surface of a hemisphere whose center is O and polar axis NOS. The Northern Hemisphere NE is projected on the plane that is tangent to the sphere at the North Pole. The equator at E and small circles of latitude as at L will be projected as concentric circles on this plane of projection, and the meridians will become straight lines passing thru the North Pole N and its corresponding projection n. The several methods of construction will be considered in the following paragraphs.

10. Perspective projection: gnomonic.—When the eye is at the center O and any radius OL is prolonged this intersects the tangent plane at a point l_g in that plane as the representative of the original point on the sphere. All great circles on the globe lie in planes passing thru its center, and are therefore represented by straight lines on the map drawn on our tangent plane in this gnomonic projection. The angles between the meridians of the globe are the same as the angles between the corresponding meridional lines on the map. As we depart from the pole N the radii of the projected circles that represent small circles of latitude become grossly exaggerated (thus AL becomes nl_g) and the radius becomes infinite for the equatorial circle, since the line OE is parallel to the tangent plane. These radii in general are computed by the formula,

$$\rho_g = nl_g = R \tan \theta = R \tan (90° - \beta) = R \cot \beta,$$

where R is the radius of the sphere, θ the north polar distance, β is the latitude, and ρ_g is the radius on the gnomonic map corresponding to any given small circle of latitude (β) on the sphere.

Charts have been published by the Hydrographic Office of the United States Navy so as to make this gnomonic projection available for the use of the navigator in drawing the shortest possible (or "great circle") route between any two points on the ocean.

11. Perspective projection: stereographic.—When the eye is placed at the South Pole S on the surface of the sphere, diametrically opposite to N, the perspective lines SE, SL, etc., will meet the tangent plane in the points e, l_s, and the corresponding radii for the map nl_s are computed by the formula,

$$\rho_s = nl_s = 2 R \tan \tfrac{1}{2} \theta = 2 R \tan \tfrac{1}{2}(90° - \beta)$$

where the letters have the same meanings as before.

In this projection all meridians on the sphere become straight lines passing thru n on the map or the tangent plane. Great circles that do not pass thru N, but are inclined to the axis of the earth by any angle, become circles on the plane of projection and intersect the equator at points diametrically opposite to each other.

The projection of the Northern Hemisphere NE as seen from S may be extended to include a large part of the Southern Hemisphere, but the distortion soon becomes excessive; however, altho not used for maps, such extension may be very convenient for the study of special geometrical problems.

All small circles drawn anywhere on the sphere are projected as circles on the plane. The practical methods of study elaborated by the late Prof. S. L. Penfield, of Yale,[2] make these stereographic projections a most convenient method for working problems in spherical trigonometry, and maps of hemispheres on this projection are useful in many meteorological problems.

12. Perspective projection: orthographic.—If the eye is placed beyond S, on NOS prolonged and at an infinite distance from O, the lines of sight become parallel to NOS and normal to the tangent plane nt. The point l_0 is the orthographic projection of L as seen from this infinite distance. The radius of the globe OE is not foreshortened for points on the equator, but the radius as projected for any other point, whose latitude is β, is foreshortened and becomes:

$$nl_0 = \rho_0 = R \sin \theta = R \cos \beta.$$

Small circles of latitude are projected as circles, but all other small circles on the globe become ovals on the map. Small circles parallel to a meridional circle become straight lines parallel to it. If the center of an inclined small circle is at the north polar distance θ, and if the angular radius of the small circle is α, then on the globe the linear radius is $R \sin \alpha$, but on the map the longest diameter of the projected oval is perpendicular to its central meridian and is $2R \sin \alpha$, while the shortest diameter of the oval is in the direction of the central meridian and is $2R \sin \alpha \cos \theta$.

The moment of inertia of any portion of the atmosphere is proportional to the square of its distance from the earth's axis of rotation, which distance is the same as ρ_0, therefore a map on this orthographic projection, when rotating about n, gives correct ideas as to moments of inertia and also as to linear distances traversed by any point in its diurnal rotation. This projection is therefore convenient for studying mechanically those problems of rotation and inertia that are treated analytically by Helmholtz and Brillouin. In so far as any other projection increases the radius it distorts the moment of inertia by a quantity that may easily be calculated.

13. Equal-surface development.—In general the maps that correspond to this title are not geometrical projections, but must be prepared by the help of numerical tables based on formulas to be deduced by the aid of the differential and integral calculus. In this development areas on the sphere are represented by proportionate areas on the map, or there is no distortion of areas; so that for every point on the globe the differential of the area of the spherical surface, or,

$$dA = 2\pi R^2 \sin \theta \, d\theta,$$

must be equal to the differential of the corresponding area on the map, which latter is $da = 4\pi\rho \, d\rho$.

In the special case of a polar projection each zone of latitude on the sphere must be represented on the map by a circular ring of equal area, and this is realized when the point L on the sphere is transferred to the point l_q on the map by using the corresponding chord of the sphere, or NL, as its radius. If the north polar distance NOL is θ, as before, then the length of this chord is $\rho_q = 2R \sin \frac{1}{2} \theta$ and the area of its circle is $\pi\rho_q^2 = 4\pi R^2 \sin^2 \frac{1}{2}\theta = 2\pi R^2 (1 - \cos \theta)$.

The area of any spherical zone between two latitudes is

$$A = 2 \pi R^2 (\cos \theta - \cos \theta'),$$

while the area of the corresponding ring on the map is

$$a = 2 \pi (\rho^2 - \rho'^2).$$

This form of development was first given by Lambert in 1719. A modification of it, known as Mollweide's, is applicable to equatorial projections and other forms of charts than the polar projection.

DeLorgna's polar map is a similar development in which each parallel becomes a circle whose radius is a mean pro-

[2] See Am. Jour. Sci., January, 1901 (4), XI.

portional between the diameter of the sphere and the height of the spherical segment belonging to that parallel.

14. Equi-meridional polar development: Postel-Werner.—In this map the curvilinear distance from the North Pole to any point, L, on the earth's surface is laid off on the map from n to l_p, therefore nl_p is the arc of which NL is the chord; it is therefore a little longer than NL, consequently any circle of latitude on this development lies a little beyond the corresponding circle in the equal-surface development. All meridians and angular rotations are correct and without distortion; all meridional distances are correct, but other distances and other angles are more or less distorted. The areas are very appreciably distorted, as also the distances at right angles to the meridian, when we get beyond 60° from the North Pole. This development was devised independently by Postel and Werner and was adopted by the Signal Service in the preparation of maps for the Daily Bulletin of International Simultaneous Meteorological Observations.

15. James's method.—The methods of charting devised respectively by Sir Henry James and Sir George B. Airy may have some special advantages for meteorological work.

In the proceedings of the Royal Geographical Society, London, 1857,[3] Sir Henry James states that some remarks by Sir John Herschel and Sir Charles Lyell led him to devise a projection that would include in one map as large a part of the earth's surface as in any way practicable by methods of projection. James's projection is a perspective method, properly so called, and may be thus stated. From a point of vision, V_j, (Plate II) outside of the sphere draw a tangent cone V_jQ; prolong this cone until it intersects the tangent plane at the point q_j and project the whole spherical surface NEQ on to this tangent plane. The angle NOQ will be larger than 90°. The region near N will be mapped with but little distortion; the region near Q will be greatly distorted. In De la Hire's globular projection of 1704 the visual point is so placed that VO is 1.707 times the radius; in Lowry's projection it is 1.69 times the radius. In Parent's projection of 1702 the visual point is placed at 2.105 times the radius, and in his second projection of 1713 it is placed at 1.594 times the radius, but James made the distance of the visual point from the center still smaller, namely, 1.5 times the radius, and therefore 2.5 times the radius from the tangent point N.

The angle NOQ, or the polar distance at the edge of the possible map, is 138° 12′; but on account of the distortion near the edge, James extended his map of 1857 only to 113° 30′; that is to say, if the center of his map had been the North Pole, it would have stopt at the Tropic of Capricorn; but by placing the center of his map at a point in latitude 23° 30′ N. and longitude 15° E., he was able to present in one chart nearly the whole of the continental portions of the globe. Such a general view of the earth is exceedingly useful in many geophysical studies, such as tides, luni-tidal strains, earthquakes, and terrestrial magnetism, and is very instructive in the study of commercial statistics and history.

16. Airy's and Clarke's methods.—Following the publication of this memoir by James came a memoir by Airy published in the London, Edinburgh, and Dublin Philosophical Magazine, 1861,[4] describing a form of development in accordance with the principle of the "balance of errors" as Airy calls it. This projection agrees with that of James as to general appearance of the resulting map, but differs as to the basic principle. A slip in Airy's analysis was corrected by A. R. Clarke and communicated by James to the Philosophical Magazine, 1862.[5] Airy's method is sometimes spoken of as a modification of James's, but it is an entirely independent method—it is a development and not a geometric projection, as he deals with the general problem of the development of a spherical surface on a plane. In this same communication of 1862, James also publishes a new projection by Clarke, who applied Airy's "balance of errors" to the problems of projection properly so called. Clarke's projection of 1862, is, therefore, a geometrical or visual projection, subject not only to the conditions peculiar to projections, but also to the conditions implied in the principle of the "balance of errors." Clarke's geometrical projection imposes a slight restraint on the freedom of Airy's development, and the results of the two methods are not mathematically identical, but are so nearly so that for ordinary maps of a hemisphere the differences are very small.

Clarke's method is graphical and can be used by any draftsman, but Airy's is analytical and requires computations and numerical tables. Neither of these two can properly be spoken of as a modification of James's projection, they having merely grown out of his first memoir, historically, by a process of suggestion. It so happens that Clarke's projection for the special case of a hemisphere becomes identical with the central part of James's projection, where the visual point is placed at the distance 1.5 R from the center; but this must be regarded as an accidental item, since Clarke's projection for the whole polar distance of 138° 12′, that might have been included in James's map, differs appreciably in its exterior portion from that map, and is much better than it in the matter of distortions.

In Airy's development nothing is said about the location of a visual point or the location of a plane of projection relative to the surface of a sphere. These matters are left entirely out of consideration, and the problem is one of pure analysis. In Clarke's memoir the location of the visual point and the place of projection relative to the sphere are specially considered, and each is made movable, so that by proper adjustment and combination the relation between them becomes such as to produce by projection a map that approximately satisfies the idea of a "balance of errors."

17. Airy's development.—Both projections and developments alike alter the relative proportions of the spherical distances, areas, and angles. The distortions thus introduced, by reason of which a map differs from the original sphere, are very undesirable, but inevitable, and force us in studying any problem to select the projection specially adapted to the question in hand.

Airy introduced the idea that the errors of distortion should be treated as errors of observation are treated in Gauss's method of least squares. He sought for a map satisfying the one condition that on the average over the whole surface of the map the square of the distortion in area plus the square of the distortion in figure or shape shall be a minimum. According to this idea one must first determine how much of the sphere is to be covered by the map, and then make the location of each point such that the sum of the squares of all the distortions shall be a minimum for that particular map. Airy called this the "balance of errors."

This condition is shown to be equivalent to the condition exprest in the formula

$$\left(\frac{\Delta z}{z}\right)^2+\left(\frac{\Delta b}{b}\right)^2=\text{minimum},$$

where the linear distortions (Δz) in latitude and (Δb) in longitude at any point are divided by the actual latitude and longitude of that point, and the minimum relates to the whole area of the chart, which in our polar projection will be a chart whose extreme radius is that for any adopted polar distance β. For the whole Northern Hemisphere β will be 90°. Airy's solution of this problem in calculus (as corrected by Clarke) can be exprest by the four following formulas, which I have rearranged so as to make the computations as simple as possible, and in which ρ represents the linear radius on the map corresponding to any angular polar distance θ on the sphere whose radius is R:

[3] Vol. I, p. 421. [4] Vol. 22, p. 409. [5] Vol. 23, p. 306-308.

1. $C_\beta = \cot^2 \frac{1}{2} \beta$ nat log $\sec^2 \frac{1}{2} \beta$.
2. $\rho_\beta = 2\, RC_\beta \tan \frac{1}{2} \beta$.
3. $C_\theta = \cot^2 \frac{1}{2} \theta$ nat log $\sec^2 \frac{1}{2} \theta$.
4. $\rho_\theta = RC_\beta \left[1 + \frac{C_\theta}{C_\beta} \right] \tan \frac{1}{2} \theta$.

TABLE 1.—*A general table of C_θ, serving for the variable C_θ and the constant C_β.*

θ	Log C_θ	θ	Log C_θ	θ	Log C_θ	θ	Log C_θ
°		°		°		°	
0	0.000 000	24	9.990 386	48	9.960 141	70	9.910 485
2	9.999 932	26	.988 673	50	.956 613	72	.904 710
4	.999 668	28	.986 833	52	.952 838	74	.898 694
6	.999 409	30	.984 852	54	.948 916	76	.892 432
8	.998 936	32	.982 721	56	.944 826	78	.885 910
10	.998 350	34	.980 459	58	.940 523	80	.879 122
12	.997 621	36	.978 031	60	.936 033	82	.872 062
14	.996 748	38	.975 444	62	.931 345	84	.864 716
16	.995 712	40	.972 708	64	.926 460	86	.857 049
18	.994 602	42	.969 807	66	.921 356	88	.849 108
20	.993 364	44	.966 723	68	9.916 035	90	9.840 826
22	9.991 954	46	9.963 531				

Taking our constant, C_β, from Table 1 for any adopted limit to the proposed chart, we then compute the values of ρ_θ for each degree of angular distance from the center of the chart, which, in the present case, would correspond to each degree of north polar distance, θ. If we adopt $\beta = 90°$, or the equator, for the limit of our chart, as we shall do, we find in Table 1 the value of log C_β = 9.840826, whence $\rho_\beta = R \times 1.3863$. If we had adopted 113° 30′, as James did for the limit of his actual chart, we should have found log C_β = 9.73785 and ρ_β = 1.6204. If we had adopted 138° 12′, as was possible for James to have done with his visual point at V so that VO = 1.5 radii, we should have had log C_β = 9.51255 and ρ_β = 1.6959. With the value of $\beta = 90°$ and the corresponding C_β we compute the values of ρ for a chart of either hemisphere as given in Table 2 for every even degree of polar distance.

TABLE 2.—*Values of ρ for a map of a hemisphere on Airy's development (β=90°; log C_β=9.8408255).*

θ=polar distance.	ρ=radius.	θ=polar distance.	ρ=radius.	θ=polar distance.	ρ=radius.	θ=polar distance.	ρ=radius.
°		°		°		°	
0	0.0000	24	0.3552	48	0.7148	70	1.0551
2	.0296	26	.3850	50	.7452	72	1.0870
4	.0591	28	.4147	52	.7756	74	1.1191
6	.0887	30	.4445	54	.8062	76	1.1514
8	.1182	32	.4743	56	.8368	78	1.1840
10	.1478	34	.5042	58	.8676	80	1.2169
12	.1774	36	.5341	60	.8985	82	1.2500
14	.2069	38	.5641	62	.9295	84	1.2835
16	.2366	40	.5941	64	.9607	86	1.3173
18	.2662	42	.6242	66	0.9920	88	1.3516
20	.2959	44	.6544	68	1.0235	90	1.3863
22	.3255	46	.6847				

18. Clarke's projection by "balance of errors."—In this projection Clarke makes both the distance from the center of the sphere to V_c, the visual point, and the distance from the plane of projection, *pp*, to the center of the sphere variable or adjustable. In Plate II let $V_c p = k$ and $V_c O = h$. These are the variables whose values are to be so adjusted that the map projected on *pp*, or the computed ρ, shall correspond to the condition of the "balance of errors," as described by Airy.

The projection from V_c thru the point L on the sphere to the corresponding point, l_c, on the map, leads to the simple geometrical relation,

$$\frac{pl_c}{pV_c} = \frac{eL}{eV_c} \text{ or } \frac{\rho}{k} = \frac{R \sin \theta}{h + R \cos \theta} \text{ or } \rho = \frac{kR \sin \theta}{h + R \cos \theta}. \quad (1)$$

Any short unit distance measured *radially* on the map is,

$$\sigma = \frac{k(1 + h \cos \theta)}{(h + \cos \theta)^2}. \quad (2)$$

And any short unit distance measured along a latitude circle on the map is,

$$\sigma' = \frac{k}{h + \cos \theta}. \quad (3)$$

The distortions are therefore $(\sigma - 1)$ and $(\sigma' - 1)$ and the sum of the squares, that is, the distortions of these distances squared and added together for the whole area of the map, has to be a minimum by the conditions of the "balance of errors;" that is to say,

$$\int_0^\beta \left[(\sigma - 1)^2 + (\sigma' - 1)^2 \right] = \text{Minimum}. \quad (4)$$

If we use the following notation:

$$H = \nu - (h + 1) \text{ nat log } (\lambda + 1) \quad (5)$$

$$H' = \frac{\lambda}{h+1} \left(2 - \nu + \frac{1}{3} \nu^2 \right) \quad (6)$$

$$\lambda = \frac{1 + \cos \theta}{h + \cos \theta} \quad (7)$$

$$\nu = (h - 1) \lambda, \quad (8)$$

then equation (4) can be written as follows:

$$M \text{ (minimum)} = 4 \sin^2 \tfrac{1}{2} \theta + 2kH + k^2 H'. \quad (9)$$

The value of this integral becomes a minimum when

$$\frac{\partial M}{\partial h} = 0 \quad (10)$$

$$\text{and } \frac{\partial M}{\partial k} = 0, \text{ simultaneously;} \quad (11)$$

and these conditions give us respectively,

$$0 = 2k \frac{\partial H}{\partial h} + k^2 \frac{\partial H'}{\partial h} \quad (12)$$

$$\text{and } 0 = 2H + 2k\, H'. \quad (13)$$

This last equation (13) gives $k = -\frac{H}{H'}$, (14)

whence the fundamental equation (9) becomes,

$$M \text{ (minimum)} = 4 \sin^2 \tfrac{1}{2} \beta - \frac{H^2}{H'}. \quad (15)$$

It remains now to find values of H and H' that will satisfy the conditions of equation (15); no method of doing this directly has yet been devised, so that the operation is performed numerically and is rather tedious. With a series of assumed values of h we compute the corresponding values of λ, ν, H, H', and $\frac{H^2}{H'}$, using that value of θ, i. e., β, that belongs to the boundary of the proposed map. By examining the resulting regular series of values of $\frac{H^2}{H'}$ we easily ascertain when this latter ratio is a maximum, and consequently when the value M is a minimum; with the corresponding value of h we can then compute $k = -\frac{H}{H'}$ as in equation (14). Table 3 gives values of h and k as computed for specific values of β.

TABLE 3.—*Values of h and k corresponding to given values of β.*

β	h	k
40	1.625	2.543
54	1.61	....
90	1.47	2.034*
	1.470	2.02766†

*Clarke. †Abbe.

For meteorological charts we propose at present to use only the values for β=90°, or a hemisphere, and according to my own calculations for this polar chart the value of ρ for any value of θ is to be computed by the following formula:

$$\rho = \frac{2.03766 \sin \theta}{1.4700 + \cos \theta} = \frac{[0.1418153] \sin \theta}{1 + \cos \theta / [0.1673173]}$$

$$= \frac{1.386166 \sin \theta}{1 + 0.680274 \cos \theta} \qquad (16)$$

With this formula we have computed Table 4 in order that the reader may make a detailed comparison between Clarke's projection and Airy's development for all parts of a hemisphere. The table has been extended to 95° in order to facilitate interpolations, but if the map is extended beyond 90° then the equatorial circle should be made prominent as a heavy line, since the "balance of errors" applies only to the region inside the equator.

By comparing the values of ρ in Tables 2 and 4 representing Airy's and Clarke's formulas, respectively, we see at once that they agree at the 90° limit as well as at 0°, but differ as we approach 35° where the maximum difference in the value of the radius amounts to nearly two per cent. As we have before said this difference is due to the fact that Clarke imposed upon the conditions peculiar to the "balance of errors" another geometrical consideration, namely, that the map should be a projection rather than a simple development, so that the "balance of errors" is not perfectly attained except in so far as is consistent with the geometrical projection.

TABLE 4.—*Values of ρ for β=90°, computed by Clarke's formula.*

θ	ρ	θ	ρ	θ	ρ	θ	ρ
°		°		°		°	
0	0.000000	25	0.362391	50	0.738807	75	1.138485
5	.072011	30	.436138	55	.816704	80	1.220883
10	.144140	35	.510562	60	.895770	85	1.303601
15	.216503	40	.585759	65	0 975762	90	1.386165
20	.289217	45	.661818	70	1.056707	95	1.467928

19. Numerical comparison of different projections.—Altho Plate II gives us a clear idea of the different styles of charting, yet a numerical tabular comparison is still more instructive. We propose now to compile a small table (Table 5) showing the values of the radii of the different circles of latitude for several systems of polar projections, as follows:

(1) The gnomonic projection, in which

$$\rho = R \tan \theta. \qquad (17)$$

(2) The stereographic, in which

$$\rho = 2 R \tan \tfrac{1}{2} \theta. \qquad (18)$$

(3) The orthographic, in which

$$\rho = R \sin \theta. \qquad (19)$$

(4) The equal-surface, in which the radii are chords, so that

$$\rho = 2 R \sin \tfrac{1}{2} \theta. \qquad (20)$$

(5) The Werner-Postel projection, in which the radii are equal to the rectified circular arcs measured from the North Pole down to any point on the sphere, so that

$$\rho = R . \frac{2\pi}{360} . \theta = R \times \theta \times 0.01746. \qquad (21)$$

(6) The James projection, in which the visual point is at a distance of 1.5 times the radius of the sphere, so that,

$$\rho_\theta = \frac{5/3 \, R \cos \theta}{1 + 2/3 \cos \theta}. \qquad (22)$$

(7) Airy's development by "balance of errors," in which for $\beta = 90°$,

$$\rho_\theta = [9.840826] R \left(1 + \frac{C_\theta}{C_\beta}\right) \mathrm{tg} \tfrac{1}{2} \theta = 0.693148 R \left(1 + \frac{C_\theta}{C_\beta}\right) \mathrm{tg} \tfrac{1}{2} \theta. (23)$$

(8) Clarke's projection by "balance of errors," in which for β=90°,

$$\rho_\theta = \frac{2.03766 \, R \sin \theta}{1.470 + R \cos \theta} = \frac{1.3862 \, R \sin \theta}{1 + 0.68027 \, R \cos \theta}. \qquad (24)$$

The values of ρ for a sphere whose radius is unity ($R = 1$) are given in Table 5 for each 10° of north polar distance. By comparison of the numbers on any horizontal line we easily see the distortions to which the spherical surface is subjected in preparing maps on these respective projections. Thus at 80° on the gnomonic projection the meridional distance from the North Pole is represented by a distance 5.671 times the radius of the sphere, while on the orthographic projection, column 3, this distance is only 0.985 times the radius. By comparing the numbers in the last three columns it will be seen that Airy's and Clarke's methods give almost identical results, and altho they differ but little from the equal-surface projection in column 4, yet that difference is decidedly in their favor, as they contract the polar regions and expand the equatorial regions, so that the distortions in shape are appreciably diminished.

TABLE 5.—*Values of ρ for various projections in terms of R as unity.*

North polar distance.	1 Gnomonic.	2 Stereographic.	3 Orthographic.	4 Equal-surface.	5 Postel-Werner.	6 James.	7 Airy. (β=90°.)	8 Clarke. (β=90°.)
°								
0	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000
10	0.176	0.174	0.174	0.174	0.175	0.1747	0.1478	0.1441
20	0.364	0.352	0.342	0.348	0.349	0.3509	0.2959	0.2892
30	0.577	0.536	0.500	0.518	0.524	0.5283	0.4445	0.4361
40	0.839	0.728	0.643	0.684	0.698	0.7092	0.5941	0.5858
50	1.192	0.932	0.766	0.846	0.873	0.8938	0.7452	0.7388
60	1.732	1.154	0.866	1.000	1.047	1.0825	0.8985	0.8958
70	2.747	1.400	0.940	1.148	1.222	1.2754	1.0551	1.0567
80	5.671	1.678	0.985	1.286	1.396	1.4710	1.2169	1.2209
90	∞	2.000	1.000	1.414	1.571	1.6667	1.3863	1.3862

The relative advantages of the projections are seen still more clearly if we prepare another table (Table 6) in which, instead of taking as our unit the radius R of the sphere, we take the radius ρ_{90}, or that of the equator on the finished map; that is to say, we compare among themselves the polar maps whose limiting equatorial radii are of equal length. This table is prepared by considering the radius of 90°, as given in Table 5, as the unit for the column of figures to which it belongs. Each figure in each column is therefore divided by the value for 90° at the bottom of its column. Such a table as this is useful when there is a prescribed limit to the size of the map (such as the dimensions of the page of an atlas), and we are required to subdivide a given area into circles corresponding to the specific polar projection. An exception must be made in the case of the gnomonic projection whose radius for 90° is infinite; gnomonic charts, of course, never extend to that point, but if such a chart be limited to the polar distance 80°, we get the figures given in column 1. Table 6 shows again that Airy's development gives us slightly less distortion for the region within 30° of the equator than any other, and is by so much to be preferred for meteorological work, since in neither map is a slight distortion of the polar regions objectionable.

TABLE 6.—*Values of ρ in terms of its value at the equator (but at latitude 10° in case of gnomonic) as unity.*

North polar distance.	1 Gnomonic.	2 Stereographic.	3 Orthographic.	4 Equal surface.	5 Postel-Werner.	6 James.	7 Airy. (β=90°).	8 Clarke. (β=90°).
°								
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	0.031	0.087	0.174	0.123	0.111	0.104	0.107	0.104
20	0.064	0.176	0.342	0.246	0.222	0.211	0.213	0.209
30	0.102	0.268	0.500	0.368	0.333	0.317	0.321	0.315
40	0.148	0.364	0.643	0.485	0.444	0.426	0.429	0.423
50	0.211	0.466	0.766	0.600	0.556	0.537	0.538	0.533
60	0.306	0.577	0.866	0.709	0.667	0.656	0.648	0.646
70	0.485	0.700	0.940	0.814	0.778	0.766	0.761	0.762
80	1.000	0.839	0.985	0.912	0.889	0.883	0.878	0.881
90	∞	1.000	1.000	1.000	1.000	1.000	1.000	1.000

20. Polar maps with rotation in the same direction.—In the polar maps of the Northern and Southern hemispheres that I have used since 1880 (see Plates I and III), I have adhered to a principle that is generally neglected in meteorolog-

ical charts, but which is all important in the mechanics of the earth's atmosphere when we come to consider its general circulation and the phenomena that depend on the diurnal rotation of the earth. The ordinary geographical maps of the Northern and Southern hemispheres are drawn as tho the observer stood over the North Pole and the South Pole, respectively, and lookt down upon the corresponding hemisphere; consequently a map of the Northern Hemisphere ordinarily represents longitude counted westward from Greenwich around the North Pole of the map as increasing in the anticyclonic or right-handed direction, while a map of the Southern Hemisphere represents the same longitudes, counted westward from Greenwich around the South Pole as increasing in the cyclonic or left-handed direction, as shown in the accompanying diagram, fig 2, Plate IV.

This method of treatment may do for descriptive geography and history and for navigators and geographers who consider only relative locations, but it is not appropriate for geophysical studies such as earthquakes. The immense inertia of the whole mass of atmosphere (revolving in one direction around the earth's axis, which we ought to call the left-handed, or positive, direction just as we do the similar direction of its annual revolution around the sun) is the most important item in meteorology, therefore we must recognize the necessity for a more rational treatment of the maps that are made for meteorological study. This is easily accomplished by drawing the polar map for the Northern Hemisphere on the plane *nn*, Plate II, as usual, viz, as seen by an observer looking down upon the earth from some point above the North Pole; then consider the earth as being transparent so that the observer, while retaining his position at or above the North Pole, looks thru the globe, as in fig. 3, Plate IV, and sees the Southern Hemisphere projected on the plane *ss* just as he had seen the Northern Hemisphere on *nn*. The two resulting maps, therefore, appear as in fig. 4, Plate IV; in both of them the longitudes circulate around the globe in the same direction as shown by arrows, L and L, while the diurnal rotation of the earth around its axis proceeds in the opposite direction as shown by the arrows R and R; the annual revolution about the sun also proceeds in this same opposite direction as shown by the arrows A and A.

By this arrangement of the maps of the Northern and Southern hemispheres, one can place the northern map above the southern with its center *n* superposed on *s*, and with a common axis of rotation so that the passage from the Northern to the Southern Hemisphere, at any point of the equator becomes continuous. In polar maps made on this system the cyclonic rotation within an area of low pressure, *x*, in the Northern Hemisphere is a positive or left-handed rotation on the map, and the so-called anticyclonic rotation around a similar area of low pressure, *y*, in the Southern Hemisphere becomes converted into a positive, a left-handed or cyclonic rotation, on the map. Thus the rules that have been formulated for ordinary usage on maps as ordinarily constructed, lose their antitheses, and the rotation about low areas is cyclonic or left-handed in both hemispheres, while the rotation about high areas is anticyclonic in both hemispheres. Any movement of the atmosphere will have a corresponding deflection toward the right on the maps of both the hemispheres alike.

If two raised maps be made according to this method, imitating the elevations and depressions of the earth's surface, one for the Northern and one for the Southern Hemisphere, respectively, and if one be placed above the other on a rotating shaft, as in fig. 5, Plate IV, and a little water be poured into the depressions on each chart, and the shaft be set in rotation, we have an approximate presentation of the action of the ocean on the globe. Experiments may thus be made with gases and liquids that shall approximately reproduce the motions of the atmosphere. By such laboratory experiments we may elucidate some of the difficulties attending the study of the general circulation of the atmosphere, since the formulas for passing from small models to the larger conditions of nature have already been given by W. von Helmholtz in his memoir on dynamic similarity.

21. Projections and models on concave surfaces.—The flat maps and models hitherto considered can serve only for a study of the motions of the lowest stratum of atmosphere, tending in general toward the equator. They must be supplemented by something better if we are to study by means of models the simultaneous motions of the upper strata which are moving in general poleward from the equator.

In the lowest stratum the general increase of temperature and humidity and the consequent diminution of density with diminution of latitude combine with the gravitational and centrifugal force to push the air toward the equator; when all this takes place on the ideal smooth sea-level surface or level surface of apparent gravity then gravity does not affect the motions except thru differences of density in masses of air of appreciable depth.

But in the upper strata the equatorial air either overflows poleward in a system of vertical circulations or overflows eastward and revolves horizontally while moving poleward in systems of circulation that soon make themselves felt at the earth's surface as areas of low pressure. In these upper strata a component of gravity is the force that overcomes the centrifugal force and other obstacles and produces the poleward flow down grade from which result the barometric gradients of our "lows" and "highs."

Hence we must devise a rotating model in which local gravitation at the laboratory shall give rise to descending poleward currents that shall simulate the overflow on the rotating globe. One way to accomplish this in a working model is to replace the flat maps by projections and models on concave curved surfaces, thus making shallow saucer-like models as in fig. 6, Plate IV. But the details of this construction belong to dynamics rather than to chartography.

THE JAMAICA HURRICANE OF OCTOBER 18-19, 1815.

By MAXWELL HALL, Esq., Government Meteorologist. Dated Chapelton, Jamaica, December 10, 1907.

This extraordinary storm, which lasted at Port Antonio for forty-eight hours, had some features resembling the hurricane of 1880. There were two centers, one of which moved slowly as it developed energy, while the other, fully developed, moved faster along its course toward the west-northwest, the usual direction. The motion of the former was abnormal; it was first toward the southwest, but when the center met the Blue Mountain Range south of Port Antonio, it stopt and even recoiled, and then advanced slowly again toward the southwest and Kingston.

Dr. W. Arnold has given a detailed account of the storm, as experienced at Port Antonio, in Vol. II of the Jamaica Physical Journal; he took great pains with the varying directions of the wind, and tabulated them at the end of his account so that there should be no mistake, and by means of a brief account of what occurred in Kingston, as given in the Royal Gazette, it is possible to make a short study of this storm. The small provisional maps attached to this article will be found useful.

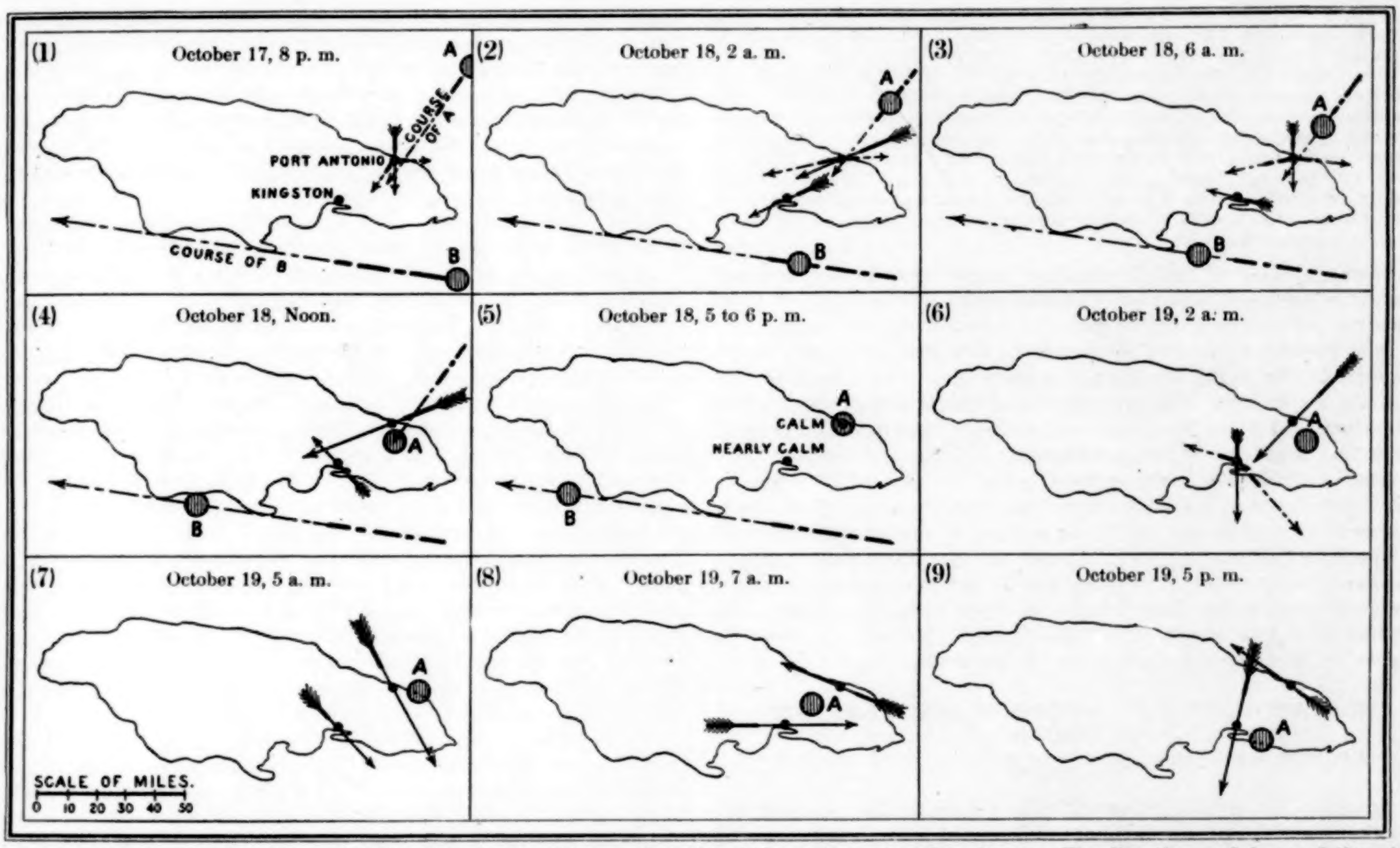
Extract from the Royal Gazette.[1]

KINGSTON, *Oct. 21st.*

SEVERE STORM.

On Tuesday, Oct. 17th, during the afternoon a heavy fall of rain set in, with a fair prospect of good October seasons; but about two o'clock on Wednesday morning it began to blow extremely hard from the eastward, from whence it changed to the SE; and on the following day it shifted to different quarter of the compass, from N to NW and W, and thence to N,

[1] From Saturday October 14, to Saturday October 21, 1815.



FIGS. 1-9.—The Jamaica hurricane of 1815. Supposed positions and paths of the centers at various hours. The direction and force of the wind at Port Antonio and Kingston are shown by arrows; the number of feathers represents the force by the Beaufort wind scale—4 indicating moderate breeze, 6 strong breeze, 8 fresh gale, 10 whole gale, 12 hurricane.

from whence it blew a perfect hurricane from about five o'clock in the after noon, and throughout the night, accompanied with heavy rain. Yesterday the weather moderated considerably, but during last night a strong breeze prevailed, which, however, lulled early this morning. Great damage has been done in all parts of the city, and almost all the wharves have suffered considerably * * *. At Up-Park Camp the new hospital at the west wing, 185 feet in length, occupied by the 18th Regiment of Foot, was completely thrown down about two o'clock on Thursday * * *. The old officers' quarters were likewise levelled to the ground, and the well-framed roof completely upset. At Stony Hill, we learn, the two northern barracks are completely uprooted, and the other buildings greatly injured * * *. The north wind occasioned a very heavy sea in Port Royal harbour; * * * in the town of Port Royal the gale was very severely felt: most of the old walls standing after the fire have been tumbled down, and the houses that remained after that calamity, as also others that have since been built, received much injury * * *. Not one of the mails from the country had arrived at the General Post Office when this paper went to press.

It may here be stated that this hurricane chiefly devastated the districts of St. David, Port Royal, and St. George—that is to say, the mountainous land between Port Antonio and Kingston. Most of the houses in these districts were rebuilt in 1816.

Dr. Arnold's account of the hurricane at Port Antonio.[2]

In the dreadful hurricane of 1815 the sky was previously clear, and a perfect calm pervaded the ocean; gentle westerly winds prevailed for a few days, which increased on the 17th of October and blew strong from that point for about three hours, when the wind veered to the north.[3] It was then evening. Little was thought what was to follow; in fact, we all considered it was nothing more than a north wind of common occurrence. I retired to rest in perfect security little anticipating the fury of the approaching storm. About midnight I was alarmed by the sudden bursting open of doors and jalousies; when they were closed and secured they did not prevent the intrusion of the rain; the wind whistled and forced the water literally through every crevice.

It blew all night from ENE;[4] towards daylight it changed again more to the N,[5] the sea rolling into the east harbour in waves of lofty grandeur.

About mid-day of the 18th the wind again changed to ENE,[6] increasing with spiteful fury; and with but trifling changes of a point or two more eastward, the hurricane maintained undiminished power over everything moveable—its force was irresistible. Trees out of number were torn up by the roots, provision and cane lands laid waste, houses unroofed, and blown to atoms.

Between five and six in the evening of this day there was an interval of comparative tranquility;[7] dark, dense, heavy masses of cloud were seen to be forced along from the NNE; but before half-past six sudden gusts again sprung up—the noise was frightful. I really do believe these gusts did more damage than when the gale blew steadily and with equal force. These squalls of wind and rain lasted till midnight. The thermometer the whole of the last twenty-four hours kept steadily at 75°; at noon of the 16th it was 82°.

After midnight I heard something like distant thunder—the tempestuous rage and roaring of the wind seemed to stifle all other sounds but its own; and had it not been for the occasional flashes of lightning, the subdued noise of the thunder would have passed unnoticed. The gale was blowing with increased violence from NE,[8] and before morning it was back again at NNW.[9] It is impossible to describe its fury at this moment—the whole firmament was dark as chaos. Thus we remained for the space of three hours, when a faint glimmer of light was perceived towards the north; it was cheering to see this beam of brightness. It was a fearful night.

Early on the morning of the 19th the wind was ESE;[10] at 7 a. m. the hurricane threatened universal destruction; the undulation of an earth-

[2] Jamaica Physical Journal, Vol. II.

[3] Fig. 1.—The wind had previously been west, due to the developing cyclone *A*; the cyclone *B*, advancing along its path, now made its presence felt, and the resulting wind was north.—*M. H.*

[4] Fig. 2.—The wind was chiefly influenced by the more powerful cyclone *B*.—*M. H.*

[5] Fig. 3.—The near approach of *A* produced this change; but there was little wind at both places.—*M. H.*

[6] Fig. 4.—The wind was now entirely influenced by *A*, which had advanced on its course and developed.—*M. H.*

[7] Fig. 5.—The onward course of *A* was arrested; and the center moving north a little, Port Antonio was in the central calm area; Kingston was between the two centers.—*M. H.*

[8] Fig. 6.—The center had moved south again a little.—*M. H.*

[9] Fig. 7.—Another very small oscillating movement northeast.—*M.H.*

[10] Fig. 8.—The center began to move again on its former southwestward course.—*M. H.*

quake was felt; the rain poured down in torrents; few who have read, few who have heard related what a hurricane is, can form but a very imperfect idea of the horrifying contention of the elements.

About noon the wind suddenly chopped round to ENE; the gale at this time was more moderate: the rain had subsided. Before 4 p. m. the gale was from the SE in dreadful gusts;[11] at 7 p. m. the rain poured down in torrents, the lightning was vivid, incessant, and terrific; a more dismal night could not be pictured in any mind; the sudden blasts of wind and rain betokened a continuation of this most frightful storm; luckily, however, before the dawn of day it moderated; at daylight on the 20th the wind was SE fresh and strong, and continued so till noon when it moderated.

Between figs. 8 and 9 another might have been inserted showing an oscillation of the center to the south of Port Antonio about noon, but it was not considered necessary.

It is greatly to be hoped that the publication of these notes may bring to light further information. For instance, we want to know how Annotto Bay and Port Maria, 30 and 40 miles west of Port Antonio, respectively, fared under a gale from the north for at least twenty-four hours. The last hurricane, in 1903, was moving rapidly, at the rate of 20 miles an hour, yet during the short time the wind was north at these places it drove the sea ashore in a most threatening manner.

Pending further inquiry, it may be remarked that without barometers, or without barometers in proper order, it would seem impossible for people in those days to arrive at any conclusion as to the nature of a "hurricane" by noting, however carefully, the varying directions of the wind.

CLIMATOLOGY OF JACKSONVILLE, FLA., AND VICINITY.

By T. FREDERICK DAVIS, Observer, U. S. Weather Bureau. Dated Jacksonville, Fla., January 31, 1908.

Situation and general remarks.—To Jacksonville belongs the distinction of being the farthest west of any city on the Atlantic seaboard. Its longitude and latitude are 81° 39′ W. and 30° 20′ N.

The city is situated on slightly rolling ground on the north bank of the St. Johns River, and has a river frontage of 2½ miles. The back country is generally flat. In a direct line the city is 16 miles from the ocean.

Under normal conditions the climate is equable, altho there are often clear, cold, bracing days in winter and high midday temperatures in summer. Early spring and late autumn are the most pleasant seasons of the year, as they are characterized by pleasant temperatures and a greater percentage of clear skies.

The changes in weather conditions in this vicinity are due chiefly to the shifting of the areas of high and low barometric pressure over the country, the amount of the change depending upon the proximity and strength of the influencing factor. In winter a spell of rainy weather is nearly always followed by a shift of wind to westerly, thru the south quadrant, and by colder weather within twelve to twenty-four hours. The storms that give these winter rains are principally of the southwestern type, originating in the west Gulf of Mexico, or in Mexico. Their normal course is northeasterly, and their influence upon local weather conditions begins when they are not more than 400 miles distant, or, in other words, about as far away as the State of Mississippi. The wind here is then northeasterly, and, as the storm progresses northeastward, it veers gradually to southeast and south, when with a rapid shift it goes to westerly, and the cold air of the advancing high-pressure area is ushered in. These conditions typify our cold waves.

In summer stagnant pressure conditions prevail. The presence in this vicinity of the West Indian storms, known as hurricanes, always produces a marked departure from normal weather conditions. These storms, fortunately, are not of frequent occurrence. So far as they affect local weather conditions, they may be divided into two classes: (1) those that recurve into the Atlantic Ocean over the lower peninsula and (2) those that enter the east Gulf and recurve about latitude 29°. Storms of the former class seldom affect conditions here, except occasionally by causing heavy rains; but with those of the second class there are experienced all the phases connected with storms of the tropical type.

Meteorological records.—The data in the tables for the period June, 1829, to August, 1833, are from the records of Judge F. Bethune, made at his plantation some 5 miles south of Jacksonville. Terdaily readings were made—about the hours of sunrise, 1 p. m., and 8 p. m., local mean time—of a thermometer that was exposed on his front porch, but unfortunately no more is known of this exposure.

The record from 1838 to January, 1872, was made by Dr. A. S. Baldwin, a man of scientific turn of mind, with a leaning toward meteorology. The lapses in this record were due to the Indian and the Civil wars. The best thermometers then obtainable were used. Doctor Baldwin's observations were made terdaily—at 7 a. m., 2 p. m., and 9 p. m., local mean time. The thermometer was exposed on the front door facing of his porch, and the instrument was well sheltered from the direct and reflected rays of the sun. Until December, 1861, the elevation was 13 feet 11 inches above sea level; beginning February, 1866, it was 20 feet, probably due to his removal to another residence two blocks farther north. In both locations the instrument was about 7 feet above the ground.

On September 11, 1871, the United States Signal Service (whose meteorological work was transferred to the United States Weather Bureau on July 1, 1891) established a station here, in the Masonic Hall Building, occupied until September 19, 1871, during which time partial observations, only, were taken. September 20, 1871, the station was removed to the Freedman's Bank Building, Pine and Forsyth streets. This office was occupied until July 21, 1880. Here the thermometers were exposed in the regulation window shelter, 20 feet above the ground. The rain gage was on the top of the building, 64 feet above the ground and 69 feet above sea level. The third office was in the Astor Building, Bay and Hogan streets, and was occupied from July 22, 1880, to July 31, 1902. The elevations of the instruments above ground were: Thermometers, 37 feet, exposed in a window shelter until October 1, 1886, when they were placed in a roof shelter 69 feet above ground; rain gage, 57 feet; anemometer, 84 feet. To reduce to sea level add 7½ feet. On August 1, 1902, the station was removed to its present location, Dyal-Upchurch Building, Bay and Main streets. Here the elevations of the instruments above the ground are: Anemometer, 129 feet; thermometers, 101 feet; rain gage, 88 feet—the ground being about 7 feet above sea level.

In Table 3 the annual minimum temperatures for the years not covered by Judge Bethune's and Doctor Baldwin's records were compiled by Maj. George R. Fairbanks, historian, who collected these data from various reliable sources.

Time used.—The entries of time until January 1, 1885, were local mean time; after that date, standard ninetieth meridian time, which is thirty-three minutes slower than local mean time, is used.

Discussion of mean temperatures.—The mean temperatures, Table 1, prior to January, 1874, were obtained by the formula $(7+2+9)\div 3$, but this gives a mean somewhat higher than the true mean. The formula $(7+2+9+9)\div 4$ gives a result very near the true mean temperature. The "Correction" line in the middle of Table 1 represents the ten-year mean of actual differences for each month between these two formulas, and these values should be applied to the Bethune and Baldwin means, and to the means of the first section, as a reduction to the true mean temperature. In finding these correc-

[11] Fig. 9—The wind remained southeast all night, showing that the center continued to move southwestward.—*M. H.*

tions the formulas were applied directly to the Bethune records, 1829–1833; the Baldwin records, 1844–1846 and 1871, and to the Signal Service records of 1872 and 1873. Since January, 1874, the mean monthly and annual temperatures have been obtained by the formula (mean max. + mean min.) ÷ 2.

TABLE I.—*Mean temperatures (Fahrenheit).*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
	°	°	°	°	°	°	°	°	°	°	°	°	°
1829	.....	.....	.....	.....	.....	81.6	82.8	84.4	80.3	72.2	59.0	64.6	.....
1830	61.1	61.6	67.6	70.4	76.7	81.0	82.8	82.2	78.3	72.2	67.3	61.0	71.8
1831	53.1	56.8	65.5	70.7	73.3	79.8	83.0	81.4	77.8	73.1	65.3	52.6	69.4
1832	56.2	66.9	62.2	70.3	76.5	78.3	81.9	80.3	79.6	73.3	63.0	61.3	70.8
1833	60.0	61.4	63.8	71.1	78.0	81.7	81.5	82.3	.....	.....	.....	.....	.....
1838	57.4	63.2	62.2	70.2	76.2	80.0	82.9	82.4	76.5	71.6	63.7	54.4	70.1
1839	54.6	56.7	62.2	66.3	78.5	86.0	85.5	83.4	78.9	72.0	60.0	49.0	69.4
1840	51.5	60.2	67.0	70.0	76.0	83.5	85.0	84.0	78.5	71.0	57.0	53.3	69.8
1841	59.2	51.0	69.8	72.0	.....	.....	.....	.....	.....	.....	.....	.....	.....
1844	55.7	56.6	63.4	72.6	80.6	82.0	84.5	80.4	77.6	70.2	66.2	52.6	70.2
1845	57.2	56.5	64.3	74.2	76.0	82.3	84.0	82.0	79.2	69.3	59.3	48.4	69.4
1846	54.6	57.6	64.2	69.3	77.8	80.2	80.4	81.4	79.9	70.6	61.1	58.1	69.6
1847	59.3	58.0	61.8	72.8	75.1	81.1	80.0	82.4	78.8	73.0	64.4	53.9	70.0
1848	58.0	54.0	65.2	70.2	77.3	81.3	80.8	80.0	78.3	70.6	55.4	63.3	69.5
1849	54.7	54.1	67.6	69.7	75.8	79.2	80.2	82.2	76.3	70.2	61.6	59.3	69.2
1850	64.1	56.8	65.0	71.1	76.7	78.2	82.9	84.7	80.7	69.2	62.5	59.0	70.9
1851	57.4	63.2	63.3	70.1	76.2	80.3	82.8	82.5	76.4	71.5	69.0	54.0	70.6
1852	47.6	61.2	61.7	69.6	78.6	78.3	81.2	80.5	78.6	73.8	63.0	60.4	69.5
1853	52.6	60.9	65.0	71.5	77.3	78.9	81.7	82.6	77.6	69.3	64.3	53.4	69.6
1854	57.5	60.4	68.2	65.2	76.4	80.5	83.3	82.7	80.9	71.2	59.3	49.4	69.6
1855	55.3	54.9	60.5	70.3	76.5	78.4	81.3	82.2	80.6	66.1	68.9	59.0	69.5
1856	47.7	53.4	61.7	70.7	76.8	81.6	82.9	82.3	76.3	68.1	64.4	54.5	68.4
1857	48.7	62.4	59.0	63.6	72.9	80.3	79.4	80.4	78.7	67.0	60.7	61.5	67.9
1858	59.4	57.5	61.9	69.9	76.2	79.3	82.3	82.0	75.5	73.0	57.6	62.0	69.7
1859	54.5	60.1	66.9	71.2	75.5	80.7	80.6	80.3	80.2	70.1	64.0	58.4	70.2
1860	55.4	62.3	63.0	72.3	75.9	81.5	83.4	80.5	79.2	69.7	61.4	53.5	69.8
1861	.....	60.3	64.0	69.6	78.4	81.6	80.5	80.3	79.2	73.4	63.3	59.1	.....
1866	.....	50.4	61.6	71.2	77.0	79.2	.....	83.0	80.7	71.2	60.6	52.0	.....
1867	51.6	61.4	62.7	69.0	74.4	79.6	83.9	81.0	79.3	70.4	63.2	59.8	69.7
1868	56.8	55.4	65.9	71.0	77.3	78.9	82.1	82.9	80.5	72.3	58.8	51.5	69.4
1869	58.8	58.5	62.7	67.5	72.3	79.0	81.1	82.3	77.9	67.3	57.3	54.7	68.3
1870	57.6	54.4	60.4	66.3	74.8	78.6	83.2	82.4	77.9	72.4	61.9	52.8	68.6
1871	55.5	63.1	67.0	72.0	74.6	80.2	81.8	80.8	77.4	74.6	64.5	55.6	70.6
1872	51.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Means*	55.6	58.5	64.0	70.1	76.3	80.4	82.2	81.9	78.6	71.0	62.2	56.2	†69.8
Corr'n ‡	−0.4	−0.5	−0.5	−0.9	−0.7	−0.6	−0.5	−0.5	−0.4	−0.4	−0.4	−0.4	−0.5
1871	.....	.....	.....	.....	.....	.....	.....	.....	.....	71.3	63.7	53.7	.....
1872	50.6	53.9	59.0	70.6	78.1	81.0	80.8	80.9	77.5	67.8	56.5	50.1	67.2
1873	51.9	59.0	59.0	69.1	75.4	80.1	83.2	81.3	78.3	66.2	58.9	55.9	68.2
1874	54.4	58.6	65.9	69.2	74.6	81.6	79.8	81.0	77.2	69.1	64.6	59.0	69.6
1875	57.4	55.8	64.2	65.8	74.6	80.0	85.3	78.9	77.9	66.4	64.6	57.8	69.1
1876	59.2	60.0	60.0	68.4	75.2	81.8	84.8	82.4	80.0	65.4	59.2	48.6	68.8
1877	57.2	55.6	60.0	67.5	72.2	81.8	83.0	81.4	79.8	71.8	62.4	56.2	69.1
1878	52.6	56.4	65.0	71.0	77.4	80.4	83.2	84.4	78.0	69.8	61.8	53.4	69.4
1879	54.2	55.4	65.3	67.2	74.2	79.5	84.2	82.0	77.2	74.2	64.0	62.8	70.0
1880	62.8	61.5	69.0	72.3	74.2	82.2	83.5	81.6	77.8	69.7	62.0	55.2	71.0
1881	53.2	58.4	59.7	67.4	75.8	83.2	84.4	82.2	80.9	75.6	66.4	62.0	70.8
1882	62.8	61.8	67.4	71.4	74.8	81.2	82.0	82.8	78.6	73.5	60.8	54.3	71.0
1883	58.2	65.2	60.6	71.0	73.8	81.8	84.4	81.8	77.2	75.4	64.1	61.4	71.2
1884	52.0	63.1	67.0	68.8	77.2	77.2	83.2	80.2	77.8	73.1	62.3	58.6	70.0
1885	56.7	55.0	58.2	68.6	74.8	81.0	83.3	82.2	79.5	68.4	61.0	54.0	68.6
1886	51.3	54.2	60.2	67.0	76.0	81.2	81.9	81.6	79.4	70.2	60.1	53.6	68.1
1887	50.4	66.2	60.2	67.8	74.1	78.8	82.8	81.8	76.6	70.6	60.8	55.6	68.8
1888	58.0	61.0	60.9	71.3	75.0	80.6	81.9	82.5	77.0	69.9	61.6	53.6	69.4
1889	55.2	52.4	59.1	67.8	74.6	78.2	81.9	79.7	78.1	67.3	63.9	62.0	68.4
1890	63.4	64.8	60.2	69.8	74.4	81.8	81.0	80.4	79.1	71.3	65.6	55.9	70.6
1891	54.2	65.6	61.6	67.4	72.8	81.1	81.2	82.3	77.6	66.9	60.0	59.6	69.2
1892	53.0	58.0	60.0	69.4	75.2	77.8	81.7	81.4	76.8	69.2	59.9	57.6	68.3
1893	49.2	61.6	60.6	72.6	75.3	80.0	83.6	81.4	78.9	70.9	62.0	58.8	69.6
1894	58.6	58.8	66.0	68.6	75.3	78.0	80.5	82.2	78.6	71.5	61.4	57.7	69.8
1895	56.1	47.6	63.0	67.2	73.8	80.2	81.8	82.9	79.1	69.7	61.0	53.5	68.0
1896	53.5	57.2	60.8	70.0	77.7	79.9	82.2	82.8	79.2	70.4	67.4	53.8	69.6
1897	52.1	60.0	68.8	69.0	73.2	83.4	82.4	82.2	76.3	71.7	65.3	58.5	70.2
1898	59.2	55.6	66.7	66.7	76.5	81.4	82.0	82.1	79.8	70.0	62.6	54.8	69.8
1899	55.2	55.4	64.6	66.0	78.3	80.1	81.2	82.8	77.4	71.8	64.6	54.9	69.4
1900	52.7	54.7	61.2	69.4	74.6	79.6	82.2	84.2	80.4	74.4	63.5	56.1	69.4
1901	54.2	52.4	60.4	63.2	75.4	78.9	82.6	80.5	78.0	69.5	56.4	52.8	67.0
1902	52.2	50.6	62.4	67.2	77.8	80.3	83.0	81.0	77.4	71.9	65.9	57.1	68.9
1903	52.8	59.2	66.8	65.5	72.5	77.9	81.2	82.0	76.8	68.8	59.6	50.4	67.8
1904	50.3	56.6	65.6	66.4	73.0	77.6	80.4	80.4	78.0	70.3	60.6	55.6	67.9
1905	49.8	52.8	63.4	68.7	78.1	79.6	82.0	79.9	79.8	70.4	63.8	53.5	68.5
1906	56.0	54.3	60.6	68.6	73.2	80.8	80.4	81.4	80.1	68.2	62.9	56.0	68.5
1907	61.1	58.2	69.8	64.0	74.8	78.3	81.7	81.8	79.0	68.3	62.2	55.6	69.6
Means §	55.0	57.7	62.9	68.4	75.1	80.2	82.4	81.7	78.4	70.3	62.3	55.9	†69.2
Hi'est ‖	64.1	66.9	69.8	74.2	80.6	86.0	85.5	84.7	80.9	75.6	69.0	64.6	71.8
Lowest ‖	47.6	47.6	58.2	63.2	72.2	77.2	79.4	78.9	75.5	65.4	55.4	48.4	67.0

* Bethune and Baldwin records.
† Average of the monthly means appearing on this line.
‡ See "Discussion of mean temperatures," in text.
§ Signal Service and Weather Bureau records.
‖ All records.

Barometric pressure.—The mean pressure for the year, at sea level and under standard gravity, is 30.06 inches. In the curve of monthly means there are two maxima and two minima; the highest mean pressure is in January, with a secondary maximum in July; the lowest mean pressure is in May, with a secondary minimum in September. The highest pressure ever recorded at this station was 30.70 inches, on January 23, 1883; the lowest, 29.06 inches, occurred during the prevalence of a hurricane, at 6 p. m., August 27, 1893.

TABLE 2.—*Maximum temperatures (Fahrenheit).*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
	°	°	°	°	°	°	°	°	°	°	°	°	°
1829	.....	.....	.....	.....	.....	92	93	92	91	82	78	80	....
1830	74	81	84	84	90	95	96	95	89	82	78	76	96
1831	72	79	84	86	88	90	92	89	88	87	78	68	92
1832	77	78	78	84	90	90	92	89	89	84	80	74	92
1833	74	81	82	83	91	92	90	92	.....	.....	.....	.....	....
1839	80	80	84	88	93	101	97	96	95	88	79	68	101
1840	74	78	85	94	92	98	96	94	94	91	79	76	98
1841	80	79	84	90	.....	.....	.....	.....	.....	.....	.....	.....	....
1844	76	79	87	93	91	89	96	94	90	84	79	76	96
1845	73	78	81	87	89	94	95	93	92	85	76	74	95
1846	71	68	80	84	93	95	93	90	90	82	79	76	95
1847	76	78	81	87	86	92	91	90	86	84	80	78	92
1848	75	79	84	84	93	88	91	91	89	80	73	78	93
1849	73	76	84	84	88	91	91	93	85	82	74	74	93
1850	79	78	82	86	89	91	97	95	94	86	77	80	97
1851	83	82	79	84	82	95	94	90	84	83	83	77	95
1852	70	83	85	87	93	92	90	90	91	87	77	79	93
1853	74	77	84	80	92	91	91	93	89	84	79	71	93
1854	76	76	87	83	90	94	95	96	93	85	81	72	96
1855	74	77	86	89	101	89	96	92	91	86	82	78	101
1856	70	79	83	87	88	93	92	95	88	81	84	76	95
1857	72	81	85	81	91	91	89	95	92	81	82	80	95
1858	77	77	83	86	91	92	96	94	86	85	79	78	96
1859	76	79	84	89	92	94	95	91	92	84	79	79	95
1860	76	79	83	92	92	97	98	93	89	87	80	72	98
1861	.....	75	83	85	94	98	92	91	92	86	79	74	98
1866	.....	78	86	96	96	100	.....	102	99	88	84	77	102
1867	79	86	89	88	92	97	98	94	93	88	86	80	98
1868	81	78	90	92	97	98	101	97	94	88	85	72	101
1869	79	79	84	91	92	97	96	100	91	87	78	78	100
1870	82	80	87	91	95	95	97	94	93	87	85	73	97
1871	80	84	87	92	90	95	96	95	93	90	86	80	96
1872	81	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
1871	.....	.....	.....	.....	.....	.....	.....	.....	.....	84	82	76	....
1872	76	79	82	90	96	101	104	99	92	86	81	78	104
1873	76	79	82	89	94	96	96	95	95	83	83	79	96
1874*	77	81	87	91	98	99	93	100	92	86	83	79	100
1875	80	82	85	86	94	99	101	95	98	86	84	81	101
1876	80	83	82	88	95	99	101	98	97	83	82	71	101
1877	80	75	81	85	96	99	100	95	96	85	84	74	100
1878	74	74	86	87	98	96	97	98	92	85	80	74	98
1879	80	79	86	88	91	96	104	96	90	86	83	79	104
1880	77	81	86	91	95	100	97	96	91	85	82	78	100
1881	72	78	80	88	96	99	99	96	94	88	83	79	99
1882	78	79	88	85	90	96	94	96	94	86	80	76	96
1883	76	83	79	88	90	95	98	94	90	92	83	78	98
1884	72	79	85	88	91	92	96	94	89	92	79	75	96
1885	78	73	79	88	89	96	95	94	92	85	81	76	96
1886	73	73	84	86	92	94	94	94	92	87	82	76	94
1887	76	84	80	89	91	95	100	97	95	88	78	76	100
1888	81	82	84	88	93	96	98	96	92	86	83	74	98
1889	74	81	81	88	94	95	97	94	95	90	86	80	97
1890	80	83	85	88	89	97	96	94	92	90	84	80	97
1891	80	86	82	86	92	100	95	97	89	89	80	80	100
1892	77	78	84	88	91	94	95	96	92	88	85	80	96
1893	72	82	84	90	93	95	100	95	96	88	84	77	100
1894	79	80	87	85	95	92	93	96	96	90	82	80	96
1895	79	76	84	85	90	96	96	97	94	89	84	80	97
1896	75	79	88	92	95	97	100	96	96	87	85	74	100
1897	76	84	82	88	93	99	99	99	94	89	83	80	99
1898	81	76	87	86	97	96	98	94	93	90	81	78	98
1899	78	81	86	85	96	97	96	98	93	87	81	76	98
1900	73	79	79	87	90	94	97	101	96	86	85	77	101
1901	76	75	82	85	93	94	97	93	92	84	79	76	97
1902	77	77	83	86	93	98	101	98	91	87	81	79	101
1903	78	81	80	82	93	90	97	97	92	86	81	76	97
1904	75	80	86	86	92	91	94	93	93	92	80	76	94
1905	75	79	81	88	92	95	94	91	94	86	81	78	95
1906	80	75	81	89	91	95	91	96	93	89	83	77	96
1907	77	77	91	83	89	94	97	95	94	87	83	78	97
Highest	83	86	91	96	101	101	104	103	99	92	86	81	104
Lowest	70	68	78	80	82	88	89	89	84	80	73	68	91

* Maximum thermometers were first used January 11, 1874; prior to that date the maximum temperatures in the table are from eye observations.

Temperature.—On the average January is the coldest month of the year, altho the annual minimum temperature occurs most frequently in December, and the lowest temperatures ever recorded were in February. The mean temperature reaches its lowest point during the first week of January, and its highest in the second decade of July. The daily minimum temperatures thruout the year nearly always occur about the

time of sunrise; the daily maximum temperature in winter occurs about 2 p. m., in spring and late autumn at 1 p. m., and in August and September about noon. The greatest number of consecutive days with the maximum temperature 90°, or above, was 31 days, in 1896, from July 20 to August 19, inclusive. The greatest number of consecutive days with the minimum temperature 32°, or below, was 8 days, in December, 1901, from the 16th to the 23d, inclusive.

TABLE 3.—*Minimum temperatures (Fahrenheit).*

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
	°	°	°	°	°	°	°	°	°	°	°	°	°
1829	.....	.....	.....	.....	.....	74	76	77	72	60	33	42	....
1830	38	40	40	46	66	64	76	72	64	52	48	30	30
1831	28	32	46	52	56	70	75	70	60	56	41	34	28
1832	22	40	30	52	64	66	76	75	71	52	38	34	22
1833	25	34	32	61	62	71	75	74	.....	.....	.....	.....	25
1835	.....	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8
1836	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33
1837	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33
1838	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23
1839	40	36	32	52	64	71	71	74	64	61	33	29	29
1840	30	32	40	56	66	69	74	74	69	46	34	32	30
1841	25	28	34	52	.....	.....	.....	.....	.....	.....	.....	.....	25
1842	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27
1843	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27
1844	24	29	38	52	.....	75	74	68	51	40	52	29	24
1845	34	30	40	49	66	70	76	71	66	50	32	20	20
1846	30	42	44	52	66	70	67	75	66	54	28	33	28
1847	25	34	42	59	60	75	73	75	68	56	30	28	25
1848	42	32	40	51	57	72	71	72	63	52	34	44	32
1849	32	22	46	42	59	74	72	74	66	32	44	44	22
1850	44	36	46	50	64	66	76	74	64	46	32	32	32
1851	32	42	46	54	62	72	70	72	54	45	40	23	23
1852	20	38	40	53	63	70	70	70	72	58	38	39	20
1853	38	32	44	47	58	69	73	74	63	47	51	34	32
1854	34	35	47	47	56	61	73	71	71	55	32	28	28
1855	33	30	28	53	61	68	74	74	73	44	40	34	30
1856	26	26	42	51	65	73	73	74	58	51	45	24	24
1857	16	44	42	42	54	72	74	72	64	42	27	39	16
1858	38	38	34	49	66	70	74	75	64	62	38	40	34
1859	30	30	45	53	64	70	70	75	70	50	35	36	30
1860	40	44	40	58	58	69	74	73	65	53	25	32	25
1861	32	42	43	54	61	73	70	73	59	57	45	38	32
1862	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31
1863	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30
1864	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29
1865	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27
1866	.....	24	30	52	64	65	.....	72	68	48	37	30	24
1867	32	32	42	50	57	72	74	73	73	52	42	35	32
1868	29	36	44	50	64	70	74	74	62	55	35	20	20
1869	36	38	32	43	58	70	72	73	68	44	34	34	32
1870	32	28	44	39	60	71	75	77	72	52	40	19	19
1871	33	42	52	55	55	72	68	72	59	58	41	29	29
1872	29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....
1871	.....	.....	.....	.....	.....	.....	.....	.....	.....	58	42	30	....
1872	28	33	42	56	57	70	75	74	70	46	31	27	27
1873	24	38	31	52	64	64	74	74	70	40	30	32	24
1874*	35	37	37	42	52	68	69	66	56	49	46	35	35
1875	40	32	40	44	52	62	70	66	59	43	43	28	28
1876	30	36	31	47	54	66	71	70	66	43	36	24	24
1877	31	37	36	45	48	63	68	70	67	50	31	29	29
1878	33	32	39	50	55	66	72	68	67	46	41	27	27
1879	25	35	44	39	60	62	68	68	61	32	34	36	25
1880	45	42	43	42	58	69	70	70	62	46	39	19	19
1881	33	34	39	37	63	66	70	70	69	54	32	41	32
1882	32	38	47	56	54	65	71	69	65	51	38	28	28
1883	29	40	40	52	54	68	70	70	62	59	43	30	29
1884	21	37	42	47	62	62	69	70	64	49	39	33	21
1885	32	32	38	47	56	68	71	70	68	49	36	32	32
1886	15	24	37	44	56	67	70	65	66	44	36	27	15
1887	22	38	36	38	55	64	69	68	55	40	26	31	22
1888	28	32	35	49	56	64	68	67	55	50	38	28	28
1889	31	31	39	44	50	54	70	64	57	45	30	35	30
1890	40	44	27	47	58	66	66	64	65	48	39	30	27
1891	30	31	38	34	54	68	66	70	65	45	33	32	30
1892	32	36	29	43	52	67	66	68	66	42	35	30	29
1893	24	41	28	53	57	68	68	69	61	45	32	35	24
1894	36	33	32	48	46	62	68	68	62	52	33	14	14
1895	26	14	40	45	55	62	70	70	64	52	35	28	14
1896	24	27	35	48	53	66	70	64	58	50	45	34	24
1897	21	34	48	44	53	68	68	68	49	54	46	36	21
1898	24	27	42	42	52	64	67	70	69	40	36	33	24
1899	38	10	26	41	61	60	67	69	54	54	45	30	10
1900	23	18	38	42	59	67	68	70	63	59	38	39	18
1901	32	29	30	45	55	65	70	68	64	51	33	20	20
1902	27	30	37	46	64	65	69	66	65	47	36	24	24
1903	28	29	48	47	60	62	69	69	61	41	26	26	26
1904	28	33	42	50	50	64	69	68	65	50	40	31	28
1905	17	26	44	43	63	66	69	69	70	52	45	35	17
1906	37	33	35	42	49	68	68	70	65	44	33	24	24
1907	38	33	53	40	59	62	70	70	68	46	43	31	31
Highest	45	44	53	61	66	75	76	77	73	62	52	44	35
Lowest	15	8	26	34	46	54	66	64	49	32	25	14	8

* Minimum thermometers were first used January 11, 1874; prior to that date the minimum temperatures in the table are from eye observations.

Precipitation.—There are two rainy and two dry seasons. The principal maximum occurs in September, with a secondary maximum in March. The dry months are April and November. The winter rains are generally due to the influence of storms of the southwestern type. The summer afternoon rains are largely in the form of thundershowers.

Abnormally high temperature in winter is usually followed within thirty-six hours by rain. In summer high midday temperatures are followed in the afternoon by thundershowers.

Snow occurs seldom, the low temperatures of winter being due to the cold, dry, non-moisture-bearing winds of anticyclones.

TABLE 4.—*Precipitation, in inches.*

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1851	.....	.....	.....	.....	.....	9.97	1.87	9.95	7.72	2.21	3.82	1.24	.....
1852	0.75	4.60	3.60	3.80	7.00	7.50	4.47	6.70	9.60	3.60	1.25	0.75	53.62
1853	2.00	0.60	2.50	0.45	1.52	3.24	7.40	2.70	9.45	9.70	2.25	3.95	45.76
1854	3.02	2.15	1.31	4.35	4.45	5.80	6.67	8.90	10.40	1.50	3.55	4.20	56.30
1855	1.45	1.50	5.35	1.15	1.00	5.42	2.15	6.15	4.34	2.55	2.72	4.10	37.88
1856	5.90	3.05	5.75	1.33	4.05	4.42	10.85	7.25	1.10	2.20	3.48	2.93	52.31
1857	1.17	0.60	2.92	2.81	2.40	3.75	9.20	10.55	3.78	2.01	1.45	6.30	46.94
1858	3.15	5.38	3.55	1.25	3.00	1.06	7.66	3.51	10.48	2.00	2.15	2.35	45.54
1859	1.98	2.30	5.45	2.15	1.45	1.95	6.75	12.15	5.05	2.50	3.35	1.80	46.88
1860	0.35	4.60	2.70	3.70	3.75	3.40	6.40	8.05	17.50	7.95	0.55	2.05	61.00
1861	.....	2.55	0.80	3.95	3.48	1.56	9.95	7.83	4.45	3.20	0.80	1.00	.....
1866	.....	4.20	3.65	1.70	2.95	4.12	.....	10.50	2.25	3.15	0.10	1.60	.....
1867	4.62	4.95	4.10	1.85	2.85	10.49	11.07	8.00	14.60	4.70	0.40	0.93	68.56
1868	2.80	2.25	1.35	2.82	3.85	12.40	7.70	4.70	6.15	3.20	0.25	2.05	49.52
1869	4.05	7.45	2.40	4.25	0.81	7.66	5.51	5.60	7.00	4.15	1.65	3.65	54.18
1870	1.05	2.25	5.40	3.20	1.50	8.15	2.65	4.40	9.35	7.10	5.29	1.95	52.29
1871	0.80	1.80	7.15	0.60	4.65	16.75	3.95	13.70	7.52	.....	.....	.....	.....
Av'g*.	2.36	3.14	3.62	2.46	3.04	6.33	6.52	8.17	7.69	3.86	2.07	2.55	§51.81
1871	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.62	3.53	2.65	.....
1872	3.44	2.70	7.32	2.43	1.25	6.67	2.92	6.41	10.79	6.37	1.76	4.81	56.87
1873	3.96	0.59	5.29	0.59	5.52	8.41	7.75	6.21	10.47	5.65	2.88	3.38	60.67
1874	0.82	7.33	2.13	1.60	5.38	5.92	7.48	6.89	7.07	0.10	2.94	0.65	48.31
1875	4.48	8.93	1.80	2.98	9.08	5.41	0.14	10.19	4.50	4.49	2.18	3.42	57.60
1876	0.61	3.05	5.41	7.89	1.87	4.17	2.82	8.07	3.73	8.92	2.60	6.12	55.26
1877	2.65	1.09	2.53	3.01	2.47	10.47	4.82	4.82	5.15	6.75	4.49	3.32	51.57
1878	3.14	5.32	2.37	5.38	1.52	5.03	4.63	2.85	21.12	3.81	1.39	3.86	60.42
1879	0.63	3.51	1.35	2.97	4.25	1.25	5.44	8.39	8.24	9.45	1.24	0.46	47.18
1880	3.17	6.17	1.69	1.50	6.24	3.00	5.94	8.96	5.21	16.25	6.09	1.29	65.51
1881	9.12	1.12	2.89	4.57	2.61	2.82	7.61	10.23	4.58	2.87	3.41	2.86	54.69
1882	2.58	1.09	0.89	5.23	2.20	5.14	5.75	5.65	4.39	10.30	5.70	4.34	53.26
1883	4.77	0.48	3.84	4.48	3.16	7.05	6.88	7.63	7.28	7.26	0.09	0.42	53.34
1884	4.78	2.45	2.63	2.32	5.45	6.89	6.02	5.21	5.68	4.12	5.43	4.04	55.02
1885	7.18	5.23	5.66	1.24	7.74	8.98	7.16	7.56	19.63	3.86	0.50	7.76	82.00
1886	2.81	1.87	6.74	3.08	2.81	4.78	14.97	6.25	4.91	2.47	0.97	3.20	54.86
1887	4.34	0.34	3.51	4.15	7.15	9.68	8.90	5.76	9.40	1.57	0.10	3.70	58.60
1888	0.49	4.38	1.57	0.93	5.46	2.92	8.30	4.89	11.15	6.00	4.16	2.88	53.13
1889	5.89	3.85	1.38	3.95	0.51	6.89	8.24	5.25	8.49	1.26	0.51	T.	46.22
1890	0.63	0.51	2.89	0.95	9.20	1.80	9.70	4.26	4.88	9.07	2.26	1.37	47.52
1891	1.19	0.32	4.02	1.72	2.78	3.31	4.08	3.67	10.83	4.43	1.53	3.46	41.34
1892	3.99	0.77	0.76	0.11	1.34	6.38	3.16	4.84	14.04	3.34	0.64	2.52	41.89
1893	0.98	6.87	8.90	2.67	4.18	4.66	4.54	10.02	6.09	4.48	1.76	3.08	58.23
1894	2.29	3.44	3.12	0.83	1.49	4.93	7.10	9.24	16.63	3.24	3.72	0.81	56.84
1895	4.63	3.61	3.63	4.40	2.26	4.98	11.21	2.54	4.66	0.58	3.12	1.18	46.80
1896	2.53	1.66	2.51	0.49	1.24	9.41	4.25	6.16	2.19	3.03	4.55	2.17	40.19
1897	1.89	7.10	1.60	5.18	1.35	5.01	3.67	6.27	16.23	6.00	1.56	4.83	60.69
1898	0.43	2.10	2.04	2.45	1.81	2.13	12.03	5.44	3.46	6.74	2.34	4.74	45.71
1899	3.98	3.38	1.35	3.21	1.86	4.52	6.12	3.90	5.10	2.73	0.07	2.35	38.57
1900	1.71	3.17	7.95	7.34	2.90	8.45	3.83	2.07	4.33	7.14	1.06	3.90	53.85
1901	2.64	6.76	6.57	1.08	5.31	9.64	4.26	6.12	7.38	1.37	0.36	2.73	54.22
1902	0.08	3.64	4.20	2.02	1.82	3.65	6.69	4.74	12.78	5.90	4.18	5.82	55.52
1903	4.44	5.23	2.55	1.54	14.80	3.22	2.54	6.60	2.80	2.83	3.82	1.66	52.03
1904	6.77	2.70	1.35	0.81	2.90	4.92	5.25	2.74	6.09	11.70	2.26	1.68	49.17
1905	1.80	4.65	6.47	2.02	6.68	2.72	5.14	10.97	6.18	2.89	0.60	5.65	55.77
1906	3.46	3.06	1.03	0.30	14.31	4.58	8.96	5.38	2.29	2.39	0.01	1.09	46.86
1907	0.14	0.55	0.76	5.27	5.40	2.71	5.55	6.53	10.44	1.37	1.96	4.39	45.07
Av'g†.	3.01	3.31	3.35	2.80	4.34	5.35	6.22	6.19	8.01	4.97	2.32	3.04	§52.91
Gr'st‡.	9.12	8.93	8.90	7.89	14.80	16.75	14.97	13.70	21.12	16.25	6.09	7.76	82.00
Least‡.	0.08	0.32	0.76	0.11	0.51	1.06	0.14	2.07	1.10	0.10	0.01	T.	37.88

Seasonal ‡: Winter, 8.98; spring, 10.07; summer, 18.64; autumn, 14.77.
T Indicates amount too small to measure.
* Baldwin record
† Signal Service and Weather Bureau records.
‡ All records.
§ Total of monthly means on this line.

In July 82 per cent of the rains occur between 7 a. m. and 7 p. m., and 81 per cent of these, or 66 per cent of all the rains of the month, occur in the afternoon—between noon and 7 p. m. Only 18 per cent are at night—7 p. m. to 7 a. m.—65 per cent of which are between midnight and 7 a. m. In January the rains are more equally distributed between day and night. In this month 64 per cent occur in the daytime—between 7 a. m. and 7 p. m.—68 per cent of which are between

noon and 7 p. m.; while of the 36 per cent that occur at night, 67 per cent are between 7 p. m. and midnight. This computation is based on the time of occurrence and not on the amount of fall.

Damaging droughts have been known in all the months of the year, except August and September. On an average of one year in four precipitation is quite insufficient at some stage of the crop-growing season. The greatest drought in the history of the station prevailed from October 27, 1889, to February 28, 1890, during which period there fell only 1.65 inches of rain, this being a minus departure from the normal of 10.5 inches. Between November 23, 1889, and January 1, 1890, merely a sprinkle (amount too small to measure) fell.

Relative Humidity.—The mean relative humidity, at three different hours of observation, computed from records for 17 or 20 years, is given in Table 5, and is plotted in fig. 1. The mean of the three series is also computed and plotted.

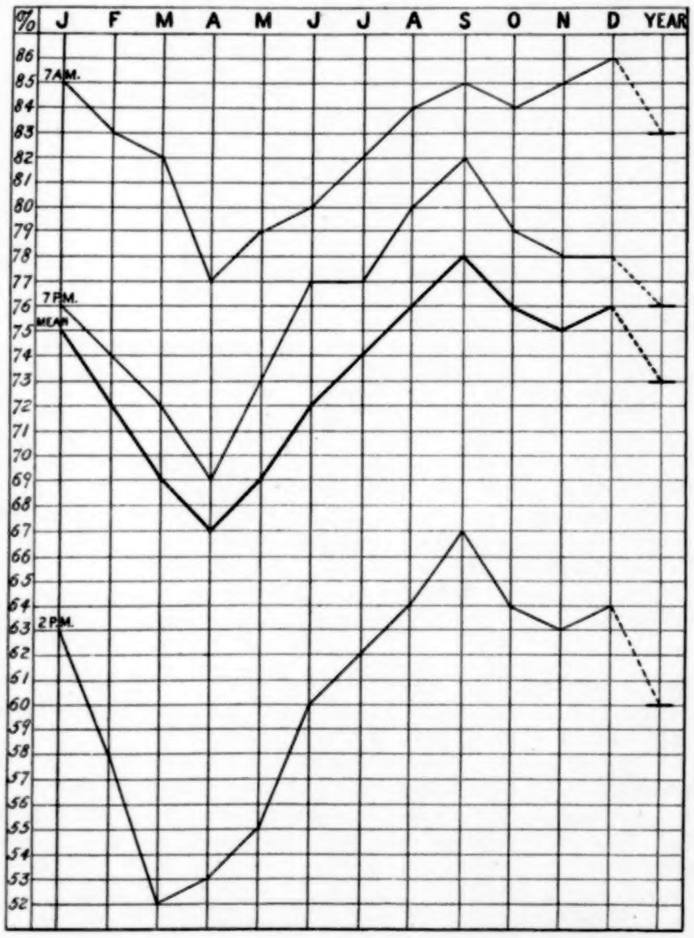


FIG. 1.—Mean relative humidity at Jacksonville, Fla., as given in Table 5.

Wind.—The prevailing winds are from the northeast during the colder months of the year, and from the southwest in summer. For the year, as a whole, 40 per cent of the winds are from the northeast and 25 per cent from the southwest, the remaining 35 per cent being more or less equally distributed among the six other principal directions of the compass.

During winter 75 per cent of the winds are from a northerly quadrant, northeast to northwest. In spring 55 per cent are from a southerly quadrant, southeast to southwest. In summer 80 per cent of the winds are southerly, southeast to southwest, with southwest largely predominating. In autumn fully 90 per cent of the winds are northerly, northeast to northwest.

During periods of abnormally high temperature in late spring, summer, and early autumn the winds are light and from a westerly quadrant; at other seasons from northeast to southeast. During periods of abnormally cold weather the winds are from the north or northwest in spring; from west to northwest in winter; and from northeast in summer and autumn.

The wind velocities are least about sunrise, when the temperature gradients are weakest. After 6 a. m. there is a gradual increase in velocity until the afternoon maximum is attained at 3 o'clock; thereafter there is a gradual decrease in velocities until about midnight. In summer the highest wind velocities are generally from the south or southwest, and occur in short thundersqualls. In winter the maximum velocities, as a rule, are from the southwest and west.

Weather.—The highest percentage of sunshine occurs during the months of least rainfall—April and November. In January and February cloudiness is greatest in the early morning and late in the afternoon, the skies being usually clear to cloudless at midday. July is the month of least sunshine. Long, drizzling rains are of greatest frequency during December. The average yearly sunshine is 50 per cent.

Frost.—With cloudless sky, calm or very gentle breeze, and relative humidity 65 per cent or more, a light frost will form when the air temperature near the ground is as high as 45°, and with a temperature of 36° the deposit will be heavy.

There is practically no danger of frost in this vicinity before the last decade of October, and a killing frost has never occurred in autumn before the second decade of November. The latest light frost in spring in the past fifty years was April 28, and the latest killing frost April 6.

Cold waves at Jacksonville.—Notable freezes and minimum temperatures:

	°F.
1835, February 8	8
1857, January 19	16
1870, December 24	19
1880, December 30	19
1886, January 12	15
1894, December 29	14
1895, February 8	14
1899, February 13	10
1900, February 18	18
1905, January 26	17

1766. John Bartram, the botanist, says the night of January 2 was the fatal night that destroyed the lime, citron, and banana trees in St. Augustine, together with many curious evergreens up the river that were nearly twenty years old, and many flowering plants and shrubs that were never before hurt. Bartram, who was then camping on the St. Johns River above Volusia, says the morning of January 3 was clear and cold; thermometer 26°, and wind northwest. The ground was frozen an inch thick on the banks of the river.[1]

1799. The temperature was very low.[1]

1828. On April 6 a heavy frost was very destructive to vegetation; the temperature at Picolata, Fla., was as low as 28°.[1]

1835. The great freeze, par excellence, occurred on February 8 of this year, when the temperature went as low as 8° at Jacksonville. The St. Johns River was frozen several rods from the shore and afforded a spectacle as new as it was distressing. All fruit trees were killed to the ground and many of them never started again, even from the roots.[1]

1845. On December 21 a temperature of 20° was recorded at Jacksonville.

1852. January 13 a cold wave prevailed and the temperature was as low as 20°.

1857, January 19 and 20. Ice two inches in thickness formed on pools and along the margin of the river on the morning of the 19th, when the temperature fell to 16°; some people tried to skate. It was the coldest day since the great freeze of 1835. On the morning of the 20th the temperature was as low as 18°.

TABLE 5.—*Means, averages, and extremes.*

Meteorological conditions.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Temperature—1874-1907:													
Mean daily maximum ..... ° F..	64.1	66.6	72.3	77.5	83.9	88.5	90.7	89.9	85.7	78.2	71.0	65.1	77.8
Mean daily minimum ..... ° F..	46.4	48.9	54.0	59.1	66.2	72.0	74.1	73.6	71.1	62.7	54.0	47.2	60.8
Mean daily range ..... ° F..	18	18	18	18	18	16	17	16	15	16	17	18	17
Maximum greatest daily range ..... ° F..	38	40	36	34	33	25	30	30	28	34	33	41	41
Minimum greatest daily range ..... ° F..	16	24	23	17	17	19	19	17	16	21	22	21	16
Mean monthly range ..... ° F..	48	47	46	42	37	29	26	27	30	39	46	47	39
Maximum monthly range ..... ° F..	58	71	60	52	49	41	36	34	45	48	56	66	71
Minimum monthly range ..... ° F..	32	38	32	29	29	27	22	21	22	26	36	38	21
Average number of days with maximum 90° or above	0	0	0	0	4	12	17	15	4	0	0	0	52
Average number of days with maximum 95° or above	0	0	0	0	0	3	5	3	0	0	0	0	11
Average number of days with minimum 36° or below	5	3	1	0	0	0	0	0	0	0	1	4	14
Average number of days with minimum 32° or below	2	1	0	0	0	0	0	0	0	0	0	2	5
Relative humidity:													
Mean, 7 a. m. (1888-1907) ..... per cent..	85	83	82	77	79	80	82	84	85	84	85	86	83
Mean, 2 p. m. (1872-1888) ..... per cent..	63	58	52	53	55	60	62	64	67	64	63	64	60
Mean, 7 p. m. (1888-1907) ..... per cent..	76	74	72	69	73	77	77	80	82	79	78	78	76
Mean, 7 a. m., 2 p. m., and 7 p. m. ..... per cent..	75	72	69	67	69	72	74	76	78	76	75	76	73
Precipitation—1872-1907:													
Greatest amount in any twenty-four hours; inches and hundredths..	3.09	3.99	4.47	4.81	9.06	5.12	4.55	6.18	9.86	5.15	3.75	4.43	9.86
Wind—1891-1907:													
Average hourly velocity ..... miles per hour	7.9	8.9	8.7	8.9	8.2	7.9	7.7	7.3	7.7	8.5	7.5	7.8	8.1
Maximum velocity for five minutes (1872-1907) ..... miles per hour..	57	75	61	51	56	62	47	55	70	62	40	51	75
direction	sw.	sw.	s.	sw.	se.	sw.	sw.	w.	se.	se.	sw.	sw.	sw.
Prevailing wind direction (1872-1907)	ne.	ne.	sw.	sw.	ne.	sw.	sw.	sw.	ne.	ne.	ne.	n.	ne.
Weather—1872-1907:													
Average number of clear days	10	10	12	13	12	8	8	8	9	12	11	11	124
Average number of partly cloudy days	11	9	12	11	14	15	16	17	12	11	11	11	150
Average number of cloudy days	10	9	7	6	5	7	7	6	9	8	8	9	91
Average cloudiness, sunrise to sunset (1891-1907) ..... scale 0 to 10..	5.3	5.4	4.7	4.3	4.5	5.3	5.7	5.5	5.5	5.1	4.9	5.1	5.1
Average number of rainy days ..... 0.01 inch or more.	9	9	8	7	10	13	15	15	14	10	8	8	126
Greatest number of rainy days	17	14	19	13	16	19	26	22	21	18	17	15	148
Least number of rainy days	3	3	3	2	3	5	2	6	7	1	1	0	95
Average number of thunderstorms	1	1	2	3	6	12	14	11	5	2	1	1	59
Greatest number of thunderstorms	3	5	6	11	18	20	23	27	17	6	7	6	95

1868 and 1870. On December 25, 1868, and again on December 24, 1870, freezes occurred with temperatures of 20° and 19°, respectively. During these freezes many young buds were killed, young orange seedlings were frozen to the ground, and much fruit was destroyed.

1873, 1876, and 1879. The freezes of January 19, 1873, minimum temperature 24°; December 3, 1876, minimum 24°; and January 7, 1879, minimum 25°, wrought havoc to fruit, but did no lasting harm to trees.

1880. On December 30 the temperature fell to 19°, and great damage resulted to oranges, lemons, limes, guavas, and other fruit then on the trees. The trees were not greatly injured.

1886. Very great damage was done to fruit and young trees by the freeze of January 12.

1894. The freeze of December 29 killed all fruit on the trees, together with many young trees. Some of the more hardy fruit trees, altho damaged greatly, shortly after the freeze showed signs of recovery.

1895, February 8. This freeze was remarkable in that it followed so closely that of December 29 of the previous year. There was little fruit left to be injured, but all fruit trees were killed to the ground.

1897. On January 28 the temperature fell to 21°, and young fruit stock was damaged and vegetables nearly destroyed.

1899, February 13. The minimum temperature on the morning of the 13th was 10°, and all fruit trees, many of which were just beginning to recover from the freeze of 1895, were killed. Young stock and vegetables of every description were destroyed. Some forest trees were also killed. The temperature was below freezing all day, the highest point reached being 27°. The facilities in hand were insufficient to protect vegetables against such severe cold, altho the low temperatures were accurately forecast.

1900. On February 18 the minimum temperature was 18°, and much damage resulted to early vegetables.

1901 and 1905. The freezes of December 21, 1901, minimum temperature 20°, and of January 26, 1905, minimum 17°, damaged vegetables very much.

1906. On December 24 a minimum temperature of 24° was recorded, and considerable damage resulted to plants and vegetables.

Notes on snow and sleet.—In 1774 there was a snow storm that extended over most of Florida. The inhabitants long afterwards spoke of it as an extraordinary white rain.[1]

1852, January 13. Snow fell all the forenoon. The total amount was one-half inch (unmelted).

1855, February 28. A few flakes of snow fell.

1868, January 29. Light sleet fell during the night.

1869, February 28. There was a flurry of snow in the forenoon.

1873, January 10. A few flakes of snow fell at 7:25 a. m.

1875, February 4 and 5. Light sleet occurred between midnight and sunrise on both these dates.

1879, January 4. Sleet began at 7 p. m. and turned to rain at 8:30 p. m. On the following morning (the 5th) everything out of doors, such as trees, shrubbery, etc., was covered with ice. The weight of the ice broke the limbs of many orange trees.

1892, December 27. Light snow flurries occurred at intervals during the day.

1893, January 18. Sleet and snow fell in this city shortly after midnight. It began as sleet, turned to snow, and then to rain.

1895, February 14. At 6:22 p. m. light sleet began to fall, continuing about five minutes, when it turned to snow; snow ended in five minutes. Light snow began again at 7:20 p. m., and ended at 8 p. m.

1899, February 12 and 13. At 9:45 p. m. of the 12th, rain changed to sleet, and this to snow at 10:15 p. m. Snow continued during the night, ceasing before sunrise on the 13th. At 7 a. m. of the latter date snow on the ground was 2 inches deep, with a temperature of 10°. In sheltered places the snow remained unmelted for several days.

[1] Extracts from a paper read before the Florida State Horticultural Society by Maj. Geo. R. Fairbanks, May 8, 1895.

1901, December 16. Light snow flurries occurred at 1 p. m., and sleet fell at intervals during the afternoon.

1907, February 7. A light snow flurry occurred in the immediate vicinity of the city during the early afternoon.

Hurricanes.—The season of greatest frequency of hurricanes is from September 1 to October 15. During September the mean track of these storms lies near and almost parallel to the east Florida coast. The dates on which severe tropical storms prevailed in the vicinity of Jacksonville are given below. It will be noted that since 1841 nineteen hurricane years have occurred, and in seven of these two or three hurricanes have visited this section within one season:

1842, October 5–6..............1881, August 27.
1846, October 12...............1881, October 6.
1848, October 12...............1882, September 10–11.
1851, August 18................1882, October 11.
1852, October 9................1885, October 10–11.
1854, September 8..............1888, September 9.
1871, August 17–18.............1888, October 11.
1871, August 24................1893, June 15–16.
1874, September 28.............1893, August 27.
1876, September 16.............1893, October 12.
1878, July 11–12...............1894, September 26.
1878, September 9–11...........1894, October 9.[2]
1878, October 21–22............1896, September 29.
1880, August 29–30.............1899, October 5.

TABLE 6.—*Dates of frost.*

Year.	Light frost.		Killing frost.	
	First in autumn.	Last in spring.	First in autumn.	Last in spring.
1844	October 30	March 22	December 12	February 11
1845	November 4	February 9	November 28	February 8
1846	November 20	January 22	November 26	January 25
1854	November 14	April 19	November 29	January 2
1855	October 26	March 23	December 11	March 2
1856	December 8	March 29	December 17	February 5
1857	October 26	April 22	November 20	January 23
1858	November 10	April 28	None	March 3
1859	November 2	March 20	November 15	January 24
1860	November 3	March 14	November 25	None
1861	December 24	April 18	None	......
1866	November 24	March 30	December 11	February 16
1867	November 13	March 16	None	February 10
1868	November 2	March 5	November 21	January 31
1869	October 28	April 14	November 22	March 1
1870	November 16	April 18	December 23	February 22
1871	November 17	February 20	December 5	January 10
1872	November 16	March 4	November 16	February 4
1873	October 21	March 6	November 20	March 5
1874	December 8	January 15	December 8	January 9
1875	October 28	February 12	December 15	February 6
1876	November 20	March 22	December 1	March 22
1877	November 12	February 21	November 30	January 5
1878	November 29	March 5	December 28	February 12
1879	November 4	April 6	November 21	January 20
1880	November 16	April 13	November 16	None
1881	November 4	April 5	November 25	April 2
1882	November 15	February 6	December 17	February 6
1883	November 3	March 23	December 16	March 13
1884	November 25	February 21	December 3	February 21
1885	November 16	March 19	November 26	March 10
1886	October 29	March 11	December 6	March 11
1887	October 31	April 2	November 21	January 19
1888	November 11	March 15	December 20	February 29
1889	November 29	April 8	November 30	February 8
1890	November 1	March 17	December 29	March 17
1891	November 18	April 6	November 18	April 6
1892	October 26	April 16	November 12	March 20
1893	November 16	March 20	November 25	March 5
1894	November 7	March 31	November 12	March 27
1895	November 21	April 5	December 4	February 17
1896	October 19	April 5	December 22	March 21
1897	November 4	January 30	December 6	January 30
1898	October 23	April 8	December 6	February 22
1899	November 6	April 11	December 30	March 8
1900	November 10	April 14	None	February 25
1901	October 17	April 22	December 16	March 7
1902	November 28	April 1	December 26	February 18
1903	October 25	February 22	November 19	February 18
1904	November 14	March 15	December 29	February 12
1905	November 2	April 17	None.	February 16
1906	November 12	March 23	November 13	None
1907	October 29	April 15	December 5	February 9
Average	November 8	March 19	December 4	February 14

Earliest frost in autumn, October 17. Latest frost in spring, April 28. Earliest killing frost in autumn, November 12. Latest killing frost in spring, April 6.

[2] This is the hurricane that caused the destruction of Cedar Keys, Fla.

Tornadoes and waterspouts.—These phenomena are of rare occurrence in this part of the State.

1872, March 10. Shortly after midnight a violent wind and rainstorm past over the city. Two and a half miles north a tornado unquestionably occurred; its path varied from three-quarters to 1 mile in width, and extended from a point a short distance west of the Panama road to the St. Johns River. Large trees were uprooted or twisted off; several dwellings and barns were demolished, the inmates being more or less seriously injured, and some stock killed. It is stated that the tall grass was cut off as if by a mower and banked against prostrate trees by the wind.

1874, August 6. At 8:30 a. m. a waterspout was observed in the river about 4 miles southwest of the city. It began in a cloud which approached the river from the southwest. Just prior to the completion of the spout the water was greatly agitated; but when the funnel-shaped cloud united with the water the agitation quickly subsided and the surface of the river resembled a mirror. This phase lasted fifteen minutes, when the column gradually drew away from the water and contracted in diameter, rolled itself into a ball and rapidly disappeared into the cloud.

1882, September 10. A tornado occurred at Darbyville, Fla. (about 30 miles west of Jacksonville), at 9:50 p. m., causing great destruction. Several buildings were blown to pieces, seriously injuring five or more persons. Large trees were uprooted, and numbers of cattle and hogs were killed.

1888, April 18. A large waterspout was reported as having occurred about 2 miles up the river at 10:25 a. m.

1907, April 18. A severe hail and windstorm swept over the city at 3:40 p. m. On the south side of the river the storm assumed the nature of a tornado, causing much damage to Dixieland Amusement Park and to several manufacturing plants. A tugboat was sunk and the captain drowned, and another man was blown from a pile driver and drowned. No very serious damage resulted in the city, except the breakage of glass by the hail.

Auroras.—The auroral light has not been observed here since 1882. There appears to have been a period of special frequency from 1870 to 1877.

1859, August 28. The auroral light was plainly visible during the early evening.

1859, September 2. Brilliant aurora during the evening and night; the entire heavens were illumined. Many amusing incidents are told of how the more ignorant inhabitants imagined the end of the world was at hand.

1870. The aurora borealis was very brilliant on September 24, and it was again observed on October 14 and 25.

1872, February 4. The aurora was visible from 7:25 p. m. until nearly 9 p. m. It was in the form of one complete arch, with streamers projecting upward. The streamers were of rose tint. Again, on October 14 there was an aurora of moderate brilliancy about 7 p. m.

1876, May 2. Polar bands were visible in the northwest during the evening.

1877, June 4. The aurora borealis was visible from 8 until 10 p. m. When it was first observed it resembled a band of reflected light extending from N. 20° E. to N. 40° W., with the center of the arch not more than 25° above the horizon. There were no streamers.

1882, November 17. The auroral light was observed from 8:15 to 9:05 p. m. The color was a uniform pale red tint, extending to the height of 30° and from 110° W. to 20° E. The display was well marked, and attracted general attention.

Earthquakes.—The occurrence of earthquake shocks in this vicinity is of much interest. In the records of this office mention is made of these, as follows:

1879, January 12. At 11:40 p. m. slight earthquake shocks were felt thruout the city and continued thirty seconds. The

motion appeared to be from northwest to southeast, and a rumbling noise was reported to have been heard during the shocks. Earthquake shocks were felt in Lake City, Fla., at the same time.

1886, August 31. Earthquake shocks were felt in this city from 8:52 p. m. to 9:03 p. m. The first vibrations were light, but were continuous for a minute and a half, when three or four severe shocks occurred in quick succession, the most violent of which was at 8:53:30 p. m. This building (the Astor Building) vibrated with the shocks and seemed to move from east to west, as the swaying of a railroad train along a straight track, with now and then a sudden lurch, as if the train had turned a sharp curve. The windows, doors, and furniture rattled, and it was difficult for one to stand without support. Distinct earthquake shocks were felt in the city on September 1, at 3:30 a. m. and 3 p. m.; on the 3d, at 10:03 p. m.; 5th, at 10:15 and 10:18 p. m.; 8th, at 12:34 p. m.; 9th, at 12:47 p. m., and on October 22, a shock was felt thruout the city at 4:24 a. m., lasting fifteen seconds, and with energy sufficient to rattle dishes, windows, etc.

The great earthquake shock began in the city of Charleston within a few seconds of 8:51 p. m., ninetieth meridian time, on August 31, 1886.

1893, June 20. An earthquake shock was felt at 10:07 p. m. The duration was about ten seconds and the motion vibratory and continuous, direction northeast to southwest, intensity moderate.

THE UTILIZATION OF MIST, FOG, DEW, AND CLOUD.

In the MONTHLY WEATHER REVIEW, October, 1898, and March, 1899,[1] we suggested methods by which the fog and cloud particles driven by the wind over a region where but little rain falls could be caught and led to the roots of plants and thus made as effective as rain in promoting the growth of useful vegetation. If the large quantity of water that drips from leaves in foggy weather could be quickly conducted to the soil and conserved at a depth of a few inches, it would largely replace the defect of rainfall in a droughty season.

It would seem that the formation of dew also may be intensified and accelerated, so that dew, properly so called, can be led directly to the absorbing rootlets of plants. A dew-pond, however, need not rely wholly upon dew; it may be so constructed that dew, fog-drip, and rain shall all be utilized to maintain the pond. The experiments that have been successful in the moist climate of Great Britain, as explained in the following article by E. A. Martin, are surely worth trying in many portions of the United States.—*C. A.*

DEW-PONDS.

By EDWARD A. MARTIN, F. G. S.

[Reprinted from Knowledge and Scientific News, May and June, 1907, omitting the illustrations.]

The literature devoted to the subject of dew-ponds is of a very scanty nature, whilst those writers who have dealt with the subject differ considerably amongst themselves as to the principles, if any, on which such ponds are formed, and also, indeed, as to whether the ponds have any right to be called "dew-ponds" at all.

In considering the subject, it is, of course, primarily necessary to recognize clearly how dew is formed, but even in what appears to be such an elementary matter as this there is not a unanimity of opinion. Many meteorologists still maintain the old theory, which is certainly the popular theory, that dew is formed by the precipitation of the aqueous vapour already existing in the lower layers of the atmosphere, when the radiation of heat from the earth has caused its surface to be in the condition to chill below the dew-point the layer of saturated air in contact with it. Precipitated moisture may appear in the form of dew, hoar-frost, mist, fog, or cloud, but in dew and hoar-frost there is precipitation without a cloudy intermediary. Freest radiation of heat from the earth's surface takes place when there are no clouds to reflect to earth the heat which it gives off at night. If there are no clouds, the chilling of the ground and of the layer of air in contact with it will be considerable, and the temperature may be reduced to the dew-point.

During the last twenty years the acceptance of Dr. J. Aitken's theory has been rapidly growing, that dew is really formed from the moisture which rises out of the soil with the radiation of heat, and that it is this which is precipitated when the air into which it passes has been so reduced in temperature as to be unable to hold it as aqueous vapour. If this theory be the correct one it would at once dispose of the suggestion altogether that dew-ponds are fed and filled by true dew, since the acquisition of dew could only then be obtained at the expense of itself by earlier evaporation.

Messrs. Hubbard, in their "Neolithic Dew-Ponds and Cattle-ways," give some details as to the formation of these ponds, although the source of their information is not stated. They say that there is at least one wandering gang of men, who will construct for the modern farmer a dew-pond which will contain more water in the heat of summer than during the winter rains. The space hollowed out for the purpose is first thickly covered with a coating of dry straw. The straw is in turn covered by well-chosen, finely-puddled clay, and the upper surface of the clay is then closely strewn with stones. The margin of the straw has to be effectually protected by the clay, since if it becomes wet it will cease to attract the dew, as it ceases to act as a nonconductor of heat and "becomes of the same temperature as the surrounding earth." This would, of course, follow quickly if a runnel or spring were allowed to drain into the pond. The puddled clay is chilled by the process of evaporation, and the dry straw prevents the heat of the earth after a hot day from warming the clay.

It is very certain, however, that many alleged dew-ponds are not formed on this plan. This description, it will be observed, clearly presupposes that dew is formed out of the aqueous vapour already existing in the atmosphere, so that if Doctor Aitken's theory is correct, it would seem that a new name is needed to describe water that is precipitated out of the atmosphere in such a case, without the intermediate condition of mist or cloud. Such might be called "invisible mist." Some remarks by G. G. Desmond in the "Nature Notes Column" of the Daily News gave a different arrangement for the basis of the dew-pond. It was there stated that first a bed of concrete is laid down; this is covered with straw, over which is placed another layer of concrete. I have been unable to trace the authority on which this is based.

In a private letter from the maker of some ponds on the "Duke of Norfolk Downs" and on Amberley Mount, it is stated that the highest parts are chosen, as they are "more exposed to the weather" than lower down, the inference being that they are filled by the moisture-laden winds blowing in from the southwest, no consideration being given whatever to any artificial attempt to attract dew-precipitation. But as R. H. Scott says, dew can never appear when there is much wind, for the air can not remain long enough in contact with the soil for any material reduction of its temperature and consequent condensation of moisture to take place. (Int. Sci. Series, Vol. XLVI). The "weather" referred to can only, therefore, be mist or fog.

In 1877 Mr. H. P. Slade discarded the term "dew-ponds" in favour of "artificial rain-ponds," and scouted the idea that dew had any part in filling ponds at all. His remarks dealt practically with one pond, the greatest diameter of which was 69½ feet, which was constructed in 1836 at a cost of £40. It was

[1] Vol. xxvi, p. 466; Vol. xxvii, p. 113.

bedded in the Thorpe Downs, near Loughborough, on the Berkshire Hills, at a height of 450 feet above the level of the sea. Being "fed from the heavens," this fact probably gave rise to its being classed as a dew-pond. The basis of this pond was stated to be first, a layer of clay about 12 inches thick (mixed with lime to prevent the working of earth-worms), second, a coating of straw, "to prevent the sun cracking the clay," and, thirdly, a layer of loose rubble. During an interval of 40 years, till 1876, the pond had only once been dry. The exception was in 1854, and this resulted principally from the growth of rushes, whose roots struck through the clay bottom, causing leakage in what was otherwise "a waterproof bed." The straw was not held to have any particular effect in causing dew-precipitation, and the rubble, which would, of course, by the way, allow of the straw becoming saturated, was merely to prevent the hoofs of cattle trampling upon and perforating the clay, or puddle, as it is called.

Gilbert White's mention of the little ponds on the downs around Selborne is an early reference to this class of ponds, but he does not actually call them "dew-ponds," so that the name may have come into use subsequently to his time. He says: "Now we have many such little round ponds in this district; and one in particular on our sheep-down, 300 feet above my house, which, though never above three feet deep in the middle, and not more than 30 feet in diameter, and containing, perhaps, not more than two or three hundred hogsheads of water, yet never is known to fail, though it affords drink for 300 or 400 sheep, and for at least 20 head of large cattle beside. This pond, it is true, is overhung with two moderate beeches, that, doubtless, at times afford it much supply; but then we have others as small that, without the aid of trees, and in spite of evaporation from sun and wind, and perpetual consumption by cattle, yet constantly maintain a moderate share of water, without overflowing in the wettest seasons, as they would do if supplied by springs. By my journal of May, 1775, it appears that 'the small and even considerable ponds in the vales are now dried up, while the small ponds on the very tops of the hills are but little effected.' Can this difference be accounted for from evaporation alone, which certainly is more prevalent in bottoms? or, rather, have not these elevated pools some unnoticed recruits, which in the night time counterbalance the waste of the day; without which the cattle alone must soon exhaust them?"

White then quotes Doctor Hales as remarking "that more than a double quantity of dew falls on a surface of water than there does on an equal surface of moist earth," but one must remark that this does not necessarily always hold good.

J. C. Clutterbuck, in 1865, said that in making such ponds an excavation was made in the chalk on the tops of the hills, from 30 to 40 feet or more in diameter, and from four to six feet deep. The bottom was "covered with clay carefully tempered, mixed with a considerable quantity of lime. * * *" This was "protected from the action of the sun and atmosphere by a covering of straw." After this "efficient and impermeable coating or puddle" is completed, "a layer of broken chalk is placed upon it."

It will have been noticed that in the Hubbard statement the excavated hollow is, in the *first* place, covered by straw, after which puddled clay is deposited thereon, with a strewing of staves on the top of that.

I should like to trace the wandering gang of men referred to in their work. I hoped to have hit upon some of them in the summer of 1906, when I found that a pond-maker, who seemed to be well-known, was said to be at Alfriston. I interviewed him on the subject, but only found that the ponds which he made, whether on high or low ground, consisted of an excavated hollow, with a carefully concreted bottom. With thermodynamics he had nothing to do, nor did he show any inclination to advance the cause of science by building a scientific dew-pond. For £30 or £40 he would build one anywhere, but he would choose a site where runnels made their appearance in rainy weather.

In Johnson and Wright's "Neolithic Man in Northeast Surrey," reference is made to the fact that some old Surrey people do not use the term "dew-ponds" at all for these remarkably constant supplies of water which are found on the chalk hills, but call them "mist-ponds," and the more inquiry is made into the origin of them, the more difficult it is to think of the majority of them as *dew*-ponds in the full sense of the word.

It has been attempted with some success to attribute the first formation of dew-ponds to the Neolithic peoples in England, and this has been the view of various writers on the subject, the necessity very early showing itself to such people of having reliable water supplies when besieged or shut up, even though for a short time, in their hill-camps. But, as Pitt-Rivers has pointed out, the time during which such sieges lasted could not have exceeded a day or two at most, and I can not help thinking that the ponds are more likely to have been constructed principally, if not entirely, for the watering of cattle, this being just as much a necessity in times of peace as in times of strife. The herbage found on the downs was then, there is no reason to doubt, just as sweet and wholesome as it is now, and our flocks are, by preference, still found in immense numbers on the Surrey and Sussex hills, although there are no marauding bands to waylay them nowadays in the lower lands near by.

It should be noted that Pitt-Rivers, in his notes on the Winklebury Camp excavations, 850 feet above sea-level, speaks favourably of the idea that these highly-placed camps may have been watered by springs which then ran at a higher level than now. And, of course, if there were a probability of this, we should have here important evidence in favour of some dew-ponds having been filled at one time by springs. But this could never have been so in the case of those ponds which are really at the very summit of the downs. Gilbert White referred to the fact that the water-line in chalk was always found at the same level in all the wells in his district, although recent observations in Yorkshire go to show that the water-line follows the contour of the chalk hills. We know that since so many private wells and borings have tapped the chalk under London, the water level has been steadily sinking. The chalk is sometimes likened to a sponge in the way in which it soaks up water, and if this be the case, it will not yield surplus water until it has itself been saturated. But then, if the water-level be lowered, as we know it has been lowered, the chalk would still remain saturated if we grant it this soaking power, although above that water-level it would not yield a supply which could be tapped by well-sinkers. In the olden days, therefore, it would not have been any more likely to have given rise to springs than now, and little more than the mere surface drainage, or that part which remained after percolation, would have gone to fill the ponds. Pitt-Rivers also points out that in many chalk districts "there are high springs which run only in the winter, when the hills have sopped up the winter rains, and retained them like sponges at the higher levels." ("Excavations in Cranborne Chase," Vol. II., p. 237.) But this can have no reference to summit-ponds, although the statement is quite true, and was probably considerably more so in former times, when forests and woods existed which have since been cleared. Still, if these springs merely flow because the water which supplies them can not sink into saturated chalk, then the ponds which they feed have no special reason to be called "dew-ponds" at all.

Yet, as White informs us, these strange little ponds on the tops of the hills are full when those in the bottoms are dried up; that is, in times when there has been a dearth of rainfall, and this, although it is admitted that the water-level in the

chalk has sunk as compared with earlier times. And, as Johnson and Wright say, even in our times the strange spectacle is sometimes seen "of carts being sent up hill to procure water for the granges and bartons in the vale." Besides, Mr. J. C. Clutterbuck refers to the fact, evidently admitted so recently as 1865, that the tops of chalk hills are often chosen for sites, where no surface-water except rainfall can furnish a supply. Therefore, as White says, there must be "some unnoticed recruits, which in the night-time counterbalance the waste of the day."

What are these recruits? As the ponds have come somehow to be known as "dew"-ponds, it will be well first of all to consider whether dew is one of these recruits. H. V. Slade dismisses at once the possibility of it acting as such. It must be borne in mind, however, that he particularly referred to the one pond only, and in that the straw was laid on the clay or puddle, and the only object of the straw was, according to his statement, with a view "to prevent the sun cracking the clay." He did not suggest that the straw was of use in keeping the water of the pond cool. But Hubbard says that the purpose of putting the straw *under* the puddled clay is to prevent the clay receiving heat from the earth which the latter has absorbed during the warmth of a summer day. At the same time the puddled clay is chilled by the process of evaporation, and the straw acting as a nonconductor, the moisture contained in the warmer air is deposited in the form of dew. In this way an empty pond will become filled without other assistance, the condensation during the night being in excess of the evaporation during the day, until, presumably, the margin of puddled clay around the pond becomes smaller and smaller, and dew deposited thereon ceases to recruit the pond.

In the meantime, as pointed out by Professor Miall, although water itself is a bad conductor of heat, the surface of a pond would cool by radiation (very slowly), and in cooling would, of course, become denser. The layer at the surface would, therefore, sink, and give place, by convection currents, to water not yet cooled to the same extent and, therefore, less dense. The process of replacement being continued, the net result may be that the whole mass is cooled sufficiently to chill the superincumbent air below the dew-point. In this way a dew-pond, if built on the Hubbard plan, and granting the principles advanced by them, would, after becoming filled without artificial assistance, continue to receive dew (invisible mist, as I have called it), when partially filled, although the greater part of the clay were covered.

Clutterbuck, on the other hand, says that the water must, in the first place, be introduced by artificial means, but in this case we must remember that the straw was placed over the clay, and it was not claimed that the straw in any way attracted the deposition of dew. As Miall says, this seems to be decisive against the sufficiency of rainfall alone, in so far as such ponds are built after Clutterbuck's plan.

Clement Reid states that "the open downs, even in the middle of summer, receive much heavier dews than would be expected, or than are met with on the lowlands." But he adds that "thick sea-mists often cling to their top [of the open downs] for several hours after sunrise, while the plains below are already dry and sunny." This brings us to the question of mist acting as a recruiting agent, and one can not help thinking that this may be of material benefit to the pond.

The claim that dew alone is the great cause of the permanence of such ponds receives a shock from an experiment conducted by J. G. Cornish at Lockinge, in Berkshire, and recorded in C. J. Cornish's "Naturalist on the Thames." The temperature of the water in a dew-pond on Lockinge Downs on July 16, 1901, was 20° F. higher than the temperature of the air. Dew, could not, therefore, have been deposited, since the temperature would probably have been maintained throughout the night, but if not, the difference in temperature of the water and of the air would, at any rate, have been accentuated. This would be in accordance with the principle that water, although it takes longer to warm, yet when once it acquires a certain temperature it retains its heat without materially warming the air above it. Water has far less absorbing and radiating power than dry land, and, therefore, would have less effect on the air above it. Mr. R. H. Scott states that "as the specific heat of water is five times that of dry land, it takes five times as much heat to raise a given mass of water through a given range of temperature as it does to raise an equal mass of dry land."

Mr. Cornish also records that, on the other hand, five days of heavy dew in April and May, with no fog, raised the level of the same pond no less than 3½ inches. This record is so extraordinary that one hesitates to give it credence, and further similar observations are desirable. Attempts have been made from time to time to measure dew-fall, and Mr. G. Dines, in a paper "On Dew, Mist, and Fog," gave the average of his observation at 1.397 inches, or on the grass alone at 1.022 inches. "Making a liberal allowance for contingencies, it may, I think, be fairly assumed the average *annual* deposit of dew on the surface of the earth falls short of 1.5 inches." What, then, are we to say to a reported deposit of 3½ inches in five days?

One can scarcely help admitting that the positions of the ponds which are known favour the fact that fogs do add a certain quantity of water to them. The experiments of Mr. Cornish, or, rather, of the shepherd whom he engaged, are very striking. After a night of fog, the surface of his pond was found on January 18 to have risen 1½ inches; the next day, following another fog, gave 2 inches; and on January 24 an inch was measured. It was not recorded what was the principle on which the bottom of the pond was laid.

If mist be measured as a valuable agent in recruiting the ponds, then it is a fit subject for enquiry as to what steps should be taken to encourage the deposition of the mist as water. White admitted that an overhanging beech or other tree was of importance in connection with some of the ponds around Selborne. Clement Reid thinks that an overhanging tree on the side nearest the source of the moisture laden currents of air is of importance. "When a sea-mist drifts in," in early morning or towards evening, "there is a continuous drip from the smooth leaves of the overhanging tree."

The position of the pond now becomes of importance, and if the pond has a high southern or southwestern bank, it seems to act in a favourable way in causing fog to precipitate its moisture.

The Sussex Downs are the home of the dew-pond, and many a time for the whole of a day I have walked through dense fogs which have rolled in from the sea, and have finally taken their flight, as from a jumping-off ground, along the northern ridge of the downs between the Dyke and Plumpton. The trees, where there are any, such as the Holt, near Clayton, will then be seen and heard dropping water on to the leaf-soil below, whilst one's own garments become damp and clammy.

One does not like to part from the idea that dew-ponds have been correctly so named, but there is no direct proof that they are so. On the other hand, there is a good deal to throw doubt upon its correctness, since no pond, situated as they are, could fail to receive a great deal of condensation from mists.

But I am strongly inclined to think that the use of straw may have a good deal to do with the attraction of moisture to a pond. It is used in India to produce a low temperature and so obtain ice in the open, at night time. Mr. T. A. Wise has described (*Nature*, Vol. V., p. 189), a method by which quantities of ice are obtained in the neighbourhood of Calcutta. An excavation of the ground to the depth of two feet is made. This is filled with rice straw to within six inches of the surface, somewhat loosely laid. Shallow pans of porous earthenware are then filled with water, and as long as the air is comparatively still the ice forms in the pans. The straw is a powerful

radiator, and, being kept loose and dry, prevents the heat rising from the earth to the water in the pans. Heat is cut off both top and bottom, and it is stated that the temperature of the air in contact with the dishes is reduced some 20° below that two or three feet higher up. This practice certainly seems to throw some light on the use of straw at home.

One thing, at any rate, is certain, that mists contribute largely to these ponds. What we need now is a scientifically-constructed pond on the Hubbard principle as a first experiment. At present I know of no other direct and unqualified statement as to what a dew-pond really is, how it is constructed, and why it attracts the dew, and it might, I think, be put to the test. Then if it were successful in collecting water, with no artificial introduction of a supply in the first place, meteorological observations might follow to show, if possible, the laws which were most potent in accomplishing it.

NOTES FROM THE WEATHER BUREAU LIBRARY.

By C. FITZHUGH TALMAN, Assistant Librarian.

HIGHEST ASCENT OF A SOUNDING BALLOON.

In Ciel et Terre of January 1, 1908, M. Vincent describes the ascent of a sounding balloon at Uccle, Belgium, on July 25, 1907, to an altitude of 26,557 meters (87,131 feet, or about 16½ miles), the greatest altitude known to have been attained by a balloon. The meteorograph worked perfectly, and the flight of the balloon was followed with a theodolite until it had descended to an altitude of 5,000 meters. The "inversion layer," "warm layer," or "isothermal zone"—as it is variously called in the recent literature of aerial exploration—was encountered at an altitude of 12,112 meters, at which point a temperature of −57° C. was recorded. From this point upward to an altitude of 13,591 meters the temperature rose 6.7° C. As the balloon continued to ascend the recorded temperature remained about stationary for some time, then began to rise slowly, and at the highest point of the ascent a temperature of −42.2° C. was recorded. The temperatures recorded during the descent of the apparatus agreed very closely with those recorded during the ascent at corresponding altitudes, despite the fact that the balloon fell much more slowly than it rose, and the air in the latter case, passing upward thru the apparatus, did not come in contact with any part of the mechanism exposed directly to the solar rays before reaching the thermograph.

A most interesting feature of the ascent was the generally westward drift of the balloon after reaching an altitude of about 19,500 meters up to the highest point attained. A zone of easterly wind at least 7 kilometers in thickness was thus shown to exist above the region of westerly wind.

THE "GOUFFRE" IN HAITI.

The October, 1907, number of the meteorological bulletin published by Professor Scherer, of the College St Martial, Port au Prince, Haiti, contains a note on the subject of the "gouffre," which is defined as "a noise resembling the rolling of thunder or the firing of distant cannon," and is said to have been frequently observed in Haiti, especially at the time of the eruption of Krakatoa. The word "gouffre," in this sense, does not appear in the dictionaries of Larousse and Littré, and is evidently one of the many expressions peculiar to the French West Indies. The phenomenon referred to, however, is a familiar one in many parts of the world, and is known under a great variety of names. In Italy it is variously called "bomba," "rombo," "boato," "bonnito," "bombito," "bombonamento," "borbottio," "muggito," "mugghio," "urlo," "baturlio," "trabusso," "tronazza," "tuono," "tromba," "rufa," etc., and the latest Italian investigator of the subject, Prof. Tito Alippi, has invented a new name, "brontidi," borrowed from the Greek, and meaning "like thunder."[1] In Holland and Belgium the name "mistpoeffer" prevails, while English writers have generally preferred the term "barisal guns," from the name of a town (Barisal, pronounced *barisahl'*) in the Ganges delta. The German term is "Nebelzerteiler" or "Nebelknall."

[1] Ciel et Terre, 1 juillet, 1907, p. 212.

The cause or causes of this phenomenon are still obscure, but the elaborate investigations now in progress in Italy, under the direction of the Central Meteorological Office at Rome, will perhaps shed some light on the subject.

PHENOLOGY IN THE BRITISH ISLES.

Phenological observations in the British Isles have for many years been especially associated with the name of Edward Mawley, phenological recorder to the Royal Meteorological Society. Writing on "Phenology as an aid to horticulture," in the Journal of the Royal Horticultural Society for June, 1907, Mr. Mawley reviews his work in this field and presents some of the results obtained. By reducing the number of plants observed from fifty to thirteen he was able to secure a large corps of competent observers, distributed over each of the eleven districts into which the British Isles are divided both for phenological and weather-forecasting purposes.

As a result of fifteen years' observations, it is found that there is an average difference of twenty-two days between the flowering of the same plants in the south of Ireland, the earliest of the eleven districts, and the north of Scotland, the latest district. The variations in certain districts from year to year are shown in Table 1.

TABLE 1.—*Mean results, with their variations from fifteen years' average (1891-1905), for the thirteen plants in those districts where there have been sufficient observations to warrant comparisons being made.*

Years.	England, SW.		England, S.		England, Mid.		England, E.		England, NW.	
	Day of year.	Variation from average	Day of year.	Variation from average.	Day of year.	Variation from average.	Day of year.	Variation from average.	Day of year.	Variation from average.
		Days.		*Days.*		*Days.*		*Days.*		*Days.*
1891..	144	+10	144	+ 9	150	+11	147	+10	150	+ 6
1892..	139	+ 5	138	+ 3	144	+ 5	153	+ 6	147	+ 3
1893..	118	−16	122	−13	125	−14	123	−14	128	−16
1894..	126	− 8	130	− 5	135	− 4	127	−10	137	− 7
1895..	139	+ 5	138	+ 3	141	+ 2	138	+ 1	144	0
1896..	125	− 9	128	− 7	132	− 7	130	− 7	134	−10
1897..	130	− 4	132	− 3	136	− 3	132	− 5	142	− 2
1898..	133	− 1	135	0	138	− 1	136	− 1	141	− 3
1899..	136	+ 2	136	+ 1	141	+ 2	138	+ 1	145	+ 1
1900..	142	+ 8	141	+ 6	144	+ 5	143	+ 6	152	+ 8
1901..	138	+ 4	139	+ 4	141	+ 2	139	+ 2	144	0
1902..	139	+ 5	140	+ 5	145	+ 6	142	+ 5	152	+ 8
1903..	134	0	134	− 1	137	− 2	134	− 3	145	+ 1
1904..	139	+ 5	139	+ 4	142	+ 3	140	+ 3	149	+ 5
1905..	133	− 1	135	0	138	− 1	136	− 1	144	0
Mean.	134	....	135	....	139	....	137	....	144	....

TEMPERATURE OF THE UPPER AIR OVER LAPLAND.

In the Annuaire de la Société Météorologique de France, July, 1907, M. Teisserenc de Bort sums up the most important results of the observations with sounding balloons made by his assistant, M. Maurice, at Kiruna, Lapland, during the early spring of 1907. Observations were made on the same dates at the observatory of Trappes, near Paris. A comparison of the two series shows that the upper air in the vicinity of the Arctic Circle, even at the end of the winter, has a temperature differing but little from that observed at the same altitude and at the same season in middle latitudes. With regard to the vertical distribution of temperature the following facts have been established:

1. The zone in which the temperature ceases to fall (with ascent of the balloon), the so-called "isothermal zone," the existence of which was demonstrated as early as 1901 by observations at Trappes, occurs also at the Arctic Circle.

2. The curious phenomenon first observed by Assmann, viz, a slight *rise* of temperature (with ascent) within the isothermal zone, is also indicated in the observations at Kiruna.

3. In middle latitudes the altitude at which the isothermal zone begins varies by several thousand meters, according to the general weather situation. This phenomenon is very

clearly marked at Kiruna. For example, on the 7th of March, with low pressure, the isothermal zone was encountered at 8,000 meters; on the 26th, in a high pressure area, the isothermal zone began at 11,000 meters. As Mr. Rotch has recently found a similar variation in America at about 39° north latitude, this phenomenon may be assumed to prevail generally over the globe, at least outside of the Tropics.

4. The isothermal zone indicates the upper limit of the cyclonic disturbances of the atmosphere, which, in Lapland as well as in middle Europe, evidently do not extend higher than from 8,000 to 12,000 meters.

THE RAINFALL OF SOUTH AMERICA.[1]

This is the subject of an important memoir by E. L. Voss, formerly connected with the meteorological service of the State of São Paulo, Brazil, and the author of a well-known work on the climate of southern Brazil. For the past five years Doctor Voss has been diligently collecting the widely scattered literature of South American climatology, with a view to writing a memoir on the subject; but the work has proven so much heavier than he anticipated that he has found it advisable, for the present, to discuss the rainfall only.

The author tabulates and discusses data for 378 stations, giving the mean monthly and yearly amounts of rainfall and, for many stations, the probability of rainy days, maximum rainfall in twenty-four hours, duration of wet and dry periods, etc. This is the most important collection of rainfall data for South America that has yet been made, and will hereafter need to be included in every climatological library. The work is accompanied by a series of isohyetal charts, which would, perhaps, be easier to consult if they had been shaded to indicate the gradations of rainfall, instead of being printed in a number of distinct colors, having only an arbitrary relation to one another.

Doctor Voss has laid bibliographers and librarians under a heavy obligation by giving, at the close of his work, a critical annotated list of the principal publications relating to South American climatology. Much interesting information is also given regarding the development of the meteorological services in several South American states.

NOTES.

A list of the seismological stations of the world appears in the 1907-8 edition of Minerva, the invaluable "yearbook of the learned world" founded by the late Dr. Karl Trübner, of Strassburg. More than one hundred stations are enumerated.

"The artificial dispersion of fog" is the subject of a paper in the Scientific American Supplement of July 13, 1907, abstracted from the Bulletin des Ingénieurs Civils de France. The author, M. Dibos, describes experiments with two forms of apparatus, both of which appear to have been highly efficient. In the first, which is especially well suited for use on shipboard, a jet of hot air is projected into the fog in any desired direction, and produces a clear space 200 meters (656 feet) in length. In the second, Hertzian waves are used, with even better results. The author believes the latter form of apparatus would be very useful to navigation and on railroads. The Chemin de Fer du Nord has been much interested in his experiments and has installed experimental apparatus at its Paris terminal.

We learn from Nature of August 8, 1907, that the Scottish members of Parliament have requested a government grant for the purpose of reequipping and reopening the Ben Nevis observatories.

[1] Voss, Ernst Ludwig. Die Niederschlagsverhältnisse von Südamerika. Gotha: Justus Perthes. 1907. iv, 59 p. 4°. (Petermanns Mitteilungen. Ergänzungsheft Nr. 157.)

The latest annual report of the meteorological service of Ceylon (i. e., the meteorological branch of the surveyor-general's office) announced that a new astronomical and meteorological observatory was in course of erection at Colombo, and would probably be in working order by the end of 1907. Colombo is the central meteorological station of the island.

In the Annuaire de la Société Météorologique de France, Octobre, 1907, M. Chauveau reports a period of exceptional cold in the French Congo during July, 1907, the lowest temperatures generally occurring on the 18th. At Notre-Dame-des-trois-Épis (altitude 70 meters) a minimum of 13° C. (55.4° F.) was recorded, while at Brazzaville (altitude 320 meters) a temperature of 12.3° C. (54.1° F.) is reported to have occurred on the 19th. Both these readings, however, were possibly too low. The interesting feature of the report is the fact that widespread illness was caused among both the European and the native residents by a departure of only a few degrees from the usual temperatures of the season—a variation from normal conditions that would have past unnoticed in our latitudes.

The past year has witnessed the inauguration of two American periodicals devoted to aeronautics, viz, the American Magazine of Aeronautics, published in New York, and the American Aeronaut, published in St. Louis. Both are printed on good paper, illustrated with excellent half-tone plates, and edited in a conservative spirit. Several articles of meteorological interest have appeared in each.

TEMPERATURE COURSES.

By HENRY GAWTHROP. Dated Swarthmore, Pa., January 25, 1906.

There are three great temperature movements affecting the thermometers thruout the world, all closely recorded and arising from well-known causes: (1) the diurnal range between the extremes of night and day, (2) the annual seasonal changes, and (3) the nonperiodic temporary changes incident to the passing of the high and low barometric areas shown on the daily weather maps. The second of these is indicated by the normals established from the averaging, from long periods, of the daily means, and the third by the departures of the daily means from the daily normal.

I wish to call attention to a fourth great movement of temperature, as it is quite manifest to the industrial interests of the country. It is that which brings us a warm or cold winter or summer and a late or early spring or autumn. The contrast between this winter (1905-6) and that of a year ago (1904-5) may be cited—in the one case (1905-6) an open winter, with little snow and rivers free from ice, and in the other (1904-5) deep snow and great frost. This present paper is written to explain a method for measuring these great general departures, or long enduring departures, from normal temperatures.

These movements of temperature are masked much as is the tide in mid-ocean to the mariner, who can see only the waves. Yet if he could have a measure of the wave levels, above or below the general sea level, an average of such measurements would give him the tide level; and if he had this datum from points covering a vast extent of the ocean he would know of the general movement of the tides. As applicable to the motion of mercury in the thermometers this illustration is close, the daily departures being the waves and the daily normals the datum planes. We have the temperature measurements, and by eliminating the *waves* we can, I believe, determine what may well be called the temperature *tide* or *course*.

The difference between the mean temperature of a month and the normal of the month shows the departure of temperature for the month. Now if this is a good rule for the thirty days of the calendar month then it should be good for a

30-day period one day later; and, again, for another 30-day period one day later yet, and thus continuously. As a result we have progressive means and progressive departures showing the general course of temperature at a station.

To illustrate this method graphically the cold winter and early spring of 1904–5 are selected and the courses of temperature shown in fig. 1.

one days. The course now running (January, 1906) crost the normal on November 11 also, but this time from cold to warm.

The courses at many stations must be combined to find a full measure of the great thermometric "areas," which so vary our seasons. In Table 2 is shown the general movement for the record warm winter of 1889–90. Four stations—Alpena, Indianapolis, Memphis, and Galveston—are selected to com-

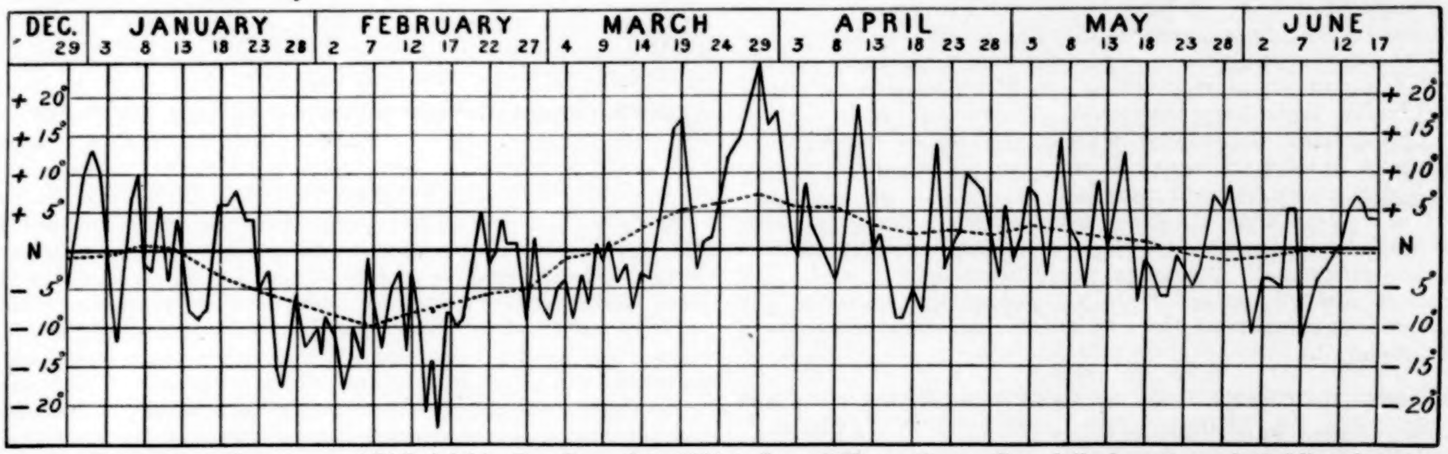


FIG. 1.—Temperature departures at Philadelphia, Pa., December, 1904, to June, 1905; continuous line, daily departures; dotted line, departure of the progressive 30-day mean.

The heaviest horizontal line, marked NN, represents the daily normal or average temperature. The scale of departures is given at the sides of the figure. The unbroken zigzag line connects the points representing the daily departures plotted to scale. The progressive departures, or the departures of the 30-day means, are plotted for each 5-day interval, for the central date, on the dates represented by the vertical lines. The dotted line connects the points thus plotted. Values might be computed and points plotted for each day, but the general course of the connecting line would not be different. Trifling irregularities would be introduced.

These wide departures of the 30-day averages of last winter and spring (1904–5) shown in fig. 1 are the most striking at Philadelphia in recent years. The cold period reached an extreme departure of −9.8° for the thirty days of which February 7 was midway. The normal was crost March 9 and a maximum positive departure reached (midway of thirty days) on March 29, 7.5°. The normal was crost again May 21, 1905.

TABLE 1.—*Departures of the 30-day means of temperature (Fahrenheit) at Philadelphia during 1903–4 and 1905–6.*

Date.	1903–4.	1905–6.	Date.	1903–4.	1905–6.
	°	°		°	°
October 25	+ 1.5	+ 0.1	January 8	− 6.5	....
October 30	+ 1.3	− 0.9	January 13	− 6.2	....
November 4	+ 1.0	− 2.3	January 18	− 5.8	....
November 9	+ 0.6	− 1.2	January 23	− 3.1	....
November 14	− 1.0	+ 1.2	January 28	− 4.4	....
November 19	− 3.7	+ 1.8	February 2	− 5.9	....
November 24	− 3.3	+ 2.1	February 7	− 6.7	....
November 29	− 4.4	+ 3.3	February 12	− 6.6	....
December 4	− 5.8	+ 3.2	February 17	− 5.7	....
December 9	− 4.5	+ 4.3	February 22	− 5.5	....
December 14	− 3.6	+ 3.5	February 27	− 5.0	....
December 19	− 4.6	+ 4.0	March 4	− 2.8	....
December 24	− 6.7	+ 4.9	March 9	− 0.7	....
December 29	− 6.3	+ 4.4	March 14	+ 0.4	....
January 3	− 5.7	+ 5.8	March 19	+ 0.3	....

Table 1 shows the contrast between the winters 1903–4 and 1905–6, in regard to these 30-day means. Each mean is an average of the daily departures for fifteen days before and fifteen days after the date. For instance, the departure entered December 4, +3.2°, is the average of the daily departures from November 20 to December 19, inclusive, and so on for the other dates. In the course for 1903–4 the normal was crost from warm to cold on November 11 and back again to warm on March 12, a course of one hundred and twenty-

pare with Philadelphia. It is evident that the movement extended far north into Canada, and far over the Gulf. From a record made in daily progression I note that while at Philadelphia the normal was crost from cold to warm on October 30, the change occurred at Alpena on November 6, at Indianapolis and Memphis on November 21, and at Galveston on November 23—some two weeks later than at the lake station.

TABLE 2.—*Departures of the 30-day means of temperature at seven stations for the winter of 1889–90, in degrees Fahrenheit.*

Middle day of period.	Philadelphia, Pa.	Galveston, Tex.	Memphis, Tenn.	Indianapolis, Ind.	Alpena, Mich.	San Diego, Cal.	Olympia, Wash.
1889.	°	°	°	°	°	°	°
October 25	− 1.1	− 1.4	− 0.3	− 2.9	− 2.1	+ 2.5	+ 1.8
October 30	+ 0.3	− 2.6	− 1.7	− 2.8	− 1.1	+ 2.9	+ 1.8
November 4	+ 0.2	− 2.5	− 2.3	− 3.4	− 1.5	+ 2.9	+ 1.3
November 9	+ 2.1	− 2.5	− 1.8	− 1.6	+ 1.7	+ 2.4	+ 0.2
November 14	+ 3.2	− 1.7	− 0.2	+ 0.5	+ 2.6	+ 2.6	+ 0.7
November 19	+ 3.2	− 1.7	− 0.8	− 0.2	+ 2.0	+ 2.7	− 0.2
November 24	+ 2.9	+ 0.9	+ 2.5	+ 2.8	+ 2.7	+ 2.8	− 0.1
November 29	+ 4.6	+ 3.6	+ 6.5	+ 5.2	+ 3.7	+ 2.6	− 1.2
December 4	+ 5.5	+ 6.2	+11.5	+ 9.3	+ 6.1	+ 2.7	− 1.5
December 9	+ 6.8	+ 7.7	+13.4	+10.4	+ 6.2	+ 2.3	− 2.0
December 14	+ 8.8	+ 9.7	+17.7	+12.9	+ 7.6	+ 1.6	− 4.0
December 19	+10.0	+11.0	+19.1	+14.8	+ 9.2	+ 0.6	− 5.5
December 24	+12.9	+12.9	+20.3	+15.5	+ 9.6	− 0.3	− 7.5
December 29	+12.3	+14.3	+21.1	+16.6	+ 9.3	− 1.6	− 7.4
1890.							
January 3	+13.5	+12.4	+16.7	+12.7	+ 7.6	− 2.4	− 7.3
January 8	+11.8	+11.8	+14.0	+10.1	+ 6.1	....	....
January 13	+10.4	+10.6	+10.5	+ 7.6	+ 5.8	....	....
January 18	+10.3	+11.4	+10.4	+ 8.1	+ 6.2	....	....
January 23	+ 9.8	+10.7	+ 9.4	+ 8.3	+ 6.8	....	....
January 28	+ 8.3	+ 7.8	+ 5.1	+ 4.4	+ 6.4	....	....
February 2	+ 7.9	+ 8.2	+ 6.4	+ 6.1	+ 8.0	....	....
February 7	+ 8.0	+ 8.2	+ 7.3	+ 7.0	+ 7.5	....	....
February 12	+ 8.0	+ 8.5	+ 7.7	+ 7.4	+ 7.7	....	....
February 17	+ 6.1	+ 4.3	+ 3.6	+ 3.2	+ 4.4	....	....
February 22	+ 2.4	+ 0.6	− 1.3	− 2.1	− 0.1	....	....
February 27	+ 3.5	+ 0.3	− 0.8	− 1.4	+ 0.6	....	....
March 4	+ 1.7	− 0.5	− 2.2	− 4.1	− 0.9	....	....
March 9	+ 1.5	− 1.1	− 2.2	− 3.2	+ 0.3	....	....
March 14	+ 1.1	− 2.2	− 2.7	− 3.5	− 0.7	....	....
March 19	+ 0.4	+ 0.1	− 1.0	− 2.4	+ 0.2	....	....

However, on the Pacific coast, during the approach of winter, the changes were almost the reverse of those at the central and eastern stations, as the two right-hand columns of Table 2 indicate.

The crest of the tide of warmth, so far as the five central and eastern stations are concerned, was at Memphis on De-

cember 29, 1889, with a 30-day departure of 21.1°; on the same day at Galveston and Indianapolis; on December 22 at Alpena, and on January 1, 1890, at Philadelphia.

As a rule, these courses of temperature pass off as deliberately as they come. The normal at Philadelphia was reached on March 17, 1890, and was crost at Alpena February 21; at Indianapolis and Memphis, February 20, and at Galveston, February 28.

These notes are suggestive of what might be found if a similar showing could be made for many stations. These large temperature movements do not fit to seasons as might be inferred from the cases cited. In the five years 1901-5 at Philadelphia there were sixteen courses of temperature having 30-day departures of 3° or more. The extremes were reached in eight different months.

It is evident that until the tides of the ocean had been observed by tide gages and the general movement measured no connection with the moon could have been traced. My belief is that we can not hope to discover the cause for our abnormal seasons until the departures from average seasons are measured.

SEASONAL DEPARTURES OF TEMPERATURE AT PHILADELPHIA, PA., DURING THE LAST TWENTY YEARS.

By HENRY GAWTHROP Dated Swarthmore, Pa., February 6, 1908.

On April 22 and October 22 the average of the day's mean temperature is the same as the average mean temperature for the year, and (at Philadelphia) these dates of equi-temperatures are midway between the coldest and warmest days of the year.

From the Philadelphia daily newspapers of January 1, April 23, and October 23, I have taken the accumulated departures of temperature; these data are all that is necessary to find the departures for the half-years shown in Table 1.

TABLE 1.—*Accumulated seasonal departures of temperature at Philadelphia, Pa.*

Years.	Summer half-year. (April 23-October 22.)		Years.	Winter half-year. (October 23-April 22.)	
	Excess. (+)	Deficiency. (−)		Excess. (+)	Deficiency. (−)
	°	°		°	°
1887	159		1887-1888		127
1888		353	1888-1889	396	
1889		26	1889-1890	951	
1890	93		1890-1891	234	
1891	27		1891-1892		17
1892	109		1892-1893		442
1893		11	1893-1894	292	
1894	177		1894-1895		338
1895	139		1895-1896	125	
1896	112		1896-1897	287	
1897	123		1897-1898	572	
1898	367		1898-1899		53
1899	131		1899-1900	258	
1900	632		1900-1901	220	
1901	286		1901-1902	63	
1902	50		1902-1903	648	
1903	10		1903-1904		578
1904	49		1904-1905		363
1905	213		1905-1906	404	
1906	314		1906-1907	3	
Sum	2,991	390	Sum	4,453	1,918

I note that there have been thirty periods of excess and ten of deficiency. The former foot up 7444° and the latter 2308°. The latest table of normals is, I believe, for about thirty-five years, so that these figures indicate that the first sixteen years must have had cold times to balance these warm years.

It is just possible that these dates of equi-temperatures might, by use, become as well established in the popular mind as the equinoctial was in the past generation. From October 23 to April 22, moreover, is approximately the period of furnace fires, and the accumulation of departures would appeal to the housekeeper.

It is also of interest to divide into three-month periods, for example:

October 23 to January 22.		January 23 to April 22.	
1904-5	−210°	1905	−153°
1905-6	+275°	1906	+129°
1906-7	+264°	1907	−261°
1907-8	+268°		

These periods of half and quarter temperature years are interesting for comparison, but are not the measure of the course of temperature desired. With the more exact measurement and the comparisons between many stations the evident great movements of temperature could be ascertained both as to area covered and their coming and going.

ELECTRIC DISTURBANCES AND PERILS ON MOUNTAIN TOPS.

By PROF. J. E. CHURCH, jr., Reno, Nev.
[Communicated January 11, 1908, by PROF. ALEXANDER G. MCADIE.]

In view of the scientific interest that has been aroused by the sudden death of mountaineers on the widely separated peaks of San Gorgonio and Whitney, during apparently the same electrical storm, in July, 1904,[1] the following recent experience of Capt. R. M. Brambila, U. S. Infantry, and the writer, will be welcomed as furnishing some hint of the power and magnitude of such electric disturbances. This experience was endured by the party during the regular visit to the automatic weather observatory maintained by the Nevada Agricultural Experiment Station on Mount Rose (altitude 10,800 feet), the dominating peak north of Lake Tahoe, on the California-Nevada State line, approximately 200 miles north of Mount Whitney.

The storm, which was mainly electric in nature, displayed itself first on the evening of Friday, October 19, 1907, in a heavy cloud mass lying close along the Carson Range, north of Mount Rose, but in no wise involving it. The flashes of lightning were frequent and heavy. Little thunder, however, if any, was heard. On the morning of the 20th, when the actual ascent of Mount Rose began, clouds gathered from the direction of Lake Tahoe about the summit, and enveloped it somewhat persistently during the day. The wind did not exceed 10 miles per hour, and the temperature remained above freezing.

From the summit itself the canyons below could be seen filled with masses of vapor. As night darkened a moderate storm of hail and snow with rain began to fall. The pack horse, which had been stabled on a terrace just below the observatory, was covered from tail to ears to protect him from the pelting missiles.

Then the electric display began, first as dull detonations to the south, and after an interval a flash at the observatory window, as if there were wires in the observatory and electricity had struck them. To this we paid little heed, for the occur-

[1] The distance between these peaks, which lie on opposite sides of the Mojave Desert, southern California, is approximately 180 miles, and the difference in elevation is 5,000 feet, the higher peak, Mount Whitney (altitude 14,499 feet [Gannett's Dictionary of Altitudes, fourth edition, gives 14,502]), being the highest mountain in the United States, excluding Alaska.

The death on San Gorgonio, said to be the first case of the kind in San Bernardino County, occurred July 24, 1904; that on Mount Whitney two days later, July 26. Referring to these fatalities Prof. Alexander G. McAdie, quoted in the Monthly Weather Review, September, 1904, page 420, says:

"The accidents have a scientific interest in that there are but few records of deaths by lightning in this State. But it should be noted that comparatively few people have been exposed to storms at high elevations. Mr. Byrd Surby was killed on the summit of Mount Whitney, within 50 feet of the monument. It was snowing at the time of the accident. It is probably not well known that the variations in the electrical potential of the air during a snowstorm are almost as rapid and as great as those prevailing during a thunderstorm. In this present case I am inclined to think that the electrical disturbance was not localized, but simply incidental to a disturbed field which extended well over the high Sierra, Inyo, Panamaint, and Telescope ranges; also the San Bernardino Range, and probably the mountains of Arizona. This condition lasted perhaps a fortnight."

rence was trivial. After a time, however, a crash a hundred feet below us and perhaps 590 feet away, and the immediate terror of the horse drew us to the door. As we emerged, every artificial projection on the summit was giving forth a brush discharge of electricity. The corners of the eaves of the observatory (made of Malthoid roofing), the arrow of the windvane, the cups of the anemometer—each sent forth its jet, while the high intake pipe of the precipitation tank on the apex of the summit was outlined with dull electric fire. Whenever our hands rose in the air every finger sent forth a vigorous flame, while an apple, partially eaten, in the hand of Captain Brambila sent forth two jets where the bite left crescent points. This latter phenomenon occurred, however, only when the apple was raised and ceased when it was lowered, so that the eating of the apple involved no visible eating of flame. To clap the climax, my felt hat above the brim flashed suddenly into flame. I could feel the draft, and it seemed to me I could hear it, too. The halo was dazzling, but before the senses could act it was gone. I had earlier rubbed Captain Brambila's hair, trying (but ineffectually) to elicit a discharge of electricity; because he was not so tall as I, nature selected me to serve as the point of electric discharge. So vivid were the flames that continued steadily to play from the corner of the observatory that I reached up to assure myself that the building was not actually on fire.

We felt no ill physical effects nor any special alarm, but for the sake of prudence we sought the interior of the observatory, where the pranks of the electricity were apparently completely avoided. About 7:30 p. m., an hour after the electric storm had burst, it had vanished. The clouds, however, continued to hover around the summit, and the following evening a heavy rainstorm swept from the mountain earthward toward Reno, gaining violence as it descended, until the valley was drenched. We followed the storm closely with but little inconvenience from rain.

Only once before have I met electricity actively present on Mount Rose. This was during the day of July 25, 1906, in a wet snowstorm accompanied by dense fog. At that time the thunder was pealing in the abyss below me, until I felt like some Jupiter hurling thunderbolts upon the earth beneath. Evidently the potential is higher during snowstorms, as Professor McAdie believes, than at other times; at least the fatality on Mount Whitney occurred during a snowstorm.

The puzzle is that the discharge took place not at the summit, but upon the rocks below. A possible reason may be found in the suggestion of Dr. R. S. Minor that the "scud which was sweeping between the heavier clouds above and the mountain mass may have become electrified by passing between the two poles, and then have discharged its electricity as it was swept down nearer the mountain, where the air currents swirl in its lee."

So far the discharges on Mount Rose have occurred at this lower point, and this habit may prove to be the security of the observatory. The large extent of the summit over which the brush discharge was active and the intensity of the discharge indicate imminent danger to the entire observatory. It was believed, when the observatory was planned, that such bolts would be induced to strike the high intake pipe on the crest; but such a conductor, it seems, would prove insignificant on account of the gigantic proportions of the electric activity. Besides it is impossible to create a satisfactory circuit from tank to mountain, for the summit is apparently one mass of shivered rock whose interstices are filled only with dry earth.

A nice cage in which to sit during thunderstorms has been suggested as affording possible immunity for the observers. It is possible that the observatory itself, which is sheathed with Malthoid roofing above and nestled in the rocks below, may serve the same purpose. The placing of wire netting around the louvered shelter where the meteorograph is installed might afford protection, but the anemometer mast may attract sufficient electricity to fuse the netting and reach the instruments by way of the mechanical connections There has been no actual danger on Mount Rose, so far as known, during the past three years, except on October 20, 1907.

EARTHQUAKES ON THE PACIFIC COAST.

By Prof. ALEXANDER G. McADIE. Dated San Francisco, Cal., January 21, 1908.

It has been brought to my attention by Prof. George Davidson that Belcher gives a short list of some earthquakes on the Pacific coast. Mention of these earthquakes is not found in Holden's Catalog of Earthquakes on the Pacific coast, and publication at this time may be of interest to seismologists thruout the world. Professor Davidson has also shown me in an old book in his possession a note concerning an earthquake felt by Francis Drake in March(?), 1579. Drake had sailed from Panama on March 13, and a few days later, while anchored off the southern coast of Costa Rica, felt a sharp shock.

In Belcher's "Voyage Round the World," London, 1843, Vol. I, p. 147, appears the following record for Acapulco, Mexico:

As far back as the year 1732 earthquakes of uncommon force have continued to afflict this city. On the 25th of February of that year a very heavy earthquake destroyed nearly the whole town. The sea rose to a great height, covering the Plaza (or about 10 feet perpendicular), the successive risings, after receding, recurring slowly at the periods of the several shocks.

On the 17th of August, 1754, another earthquake occurred, ruining the greater part of the town. On this occasion the rising of the sea was attended with more violence; the Plaza was again covered.

On the 21st of April, 1776, an earthquake occurred which destroyed many houses.

On the 14th of March, 1787, the whole town was ruined. The sea retired, leaving the rocks of the Punta Manzanilla (in the town bay) dry. The *Phillippine, Nao*, was anchored at the time in the port and was left in 4 fathoms before the tide returned—showing a fall of 36 feet.

No earthquake of consequence is recorded afterward until that of the 2d of May, 1820. This earthquake lasted several days, and entirely destroyed the place. The steeple of San Francisco fell on this occasion and the church was rent; the sea retired still farther than in 1787, and returned in two hours, rising up to the church door; the rise and fall taking place gently. At the ultimate recession the sand was found to have accumulated so as to nearly cover the pier (5 or 6 feet) by which upward of twenty varas of land was gained at the beach.

On the 10th of March, 1833, about 10 o'clock at night, a heavy earthquake was experienced. The sea retired 40 feet, and gently resumed its former level. This was felt at Mexico at precisely the same hour, lasting there about one minute and a half, the motion there being undulatory, but at Acapulco trepidatory.

On March 13, 1834, another shock is recorded; the sea receded fifty varas and several buildings were destroyed.

On the 6th of January, 1835, at 6 o'clock in the morning a very severe earthquake was felt, lasting upward of two minutes; motion trepidatory, the shocks recurring every thirty hours for upward of a month. This, like that of 1833, was felt in Mexico.

On the 9th of August, 1837, a heavy shock was felt, trepidatory, recurring at thirty hours for nearly three weeks. It was felt slightly at Mexico.

On the 18th of October, 1837, at 4 p. m., a heavy earthquake occurred, which lasted until the 22d. During this interval of four days the earth trembled continuously; one hundred separate shocks were counted between 4 p. m. 18th, and 10 p. m. 22d. During this interval five very severe shocks occurred, 4 p. m. 18th, 10 p. m. 19th, midnight 19th, 4 p. m. 20th, and 4 p. m. 21st. That at midnight on the 19th was terrific. Had it lasted a few seconds longer, rocks would undoubtedly have been rent asunder. Following this earthquake, for six weeks continuously, periodical heavy shocks were experienced, at 10 a. m., 10 and 12 p. m., and at dawn. At Mexico the shocks were severely felt at the same instants, on the 18th and 19th.

In conclusion *daily temblors* have occurred since the earthquake of 1820. But the season when the heaviest shocks occur is between March and June.

The above is extracted from notes made by a commissary resident for many years, and constantly holding office under the government of all parties.

FURTHER OBSERVATIONS OF HALOS AND CORONAS.

By M. E. T. GHEURY. Dated Eltham, England, August 3, 1907.

The accompanying table[1] gives my observations of halos, coronas, etc., during April, May, and June, 1907.

[1] This table closely follows in arrangement, abbreviations, etc., the table of the author's previous paper printed in the Monthly Weather Review, May, 1907, p. 213-215.—EDITOR.

Observations of halos, coronas, etc., at Eltham, England, April–June, 1907.

No.	Date and time of day, 1907.	Nature of phenomenon.	Previous minimum.	Previous maximum.	Mean barometer for preceding 24 hours.	Following minimum.	Following maximum.	Mean barometer for following 24 hours.	Weather at time of observation.	Weather during following 24 hours.	Description of phenomenon and general remarks.
1	2	3	4 °C	5 °C	6 Inches.	7 °C	8 °C	9 Inches.	10	11	12
20	April 4, 4 p.m.	Halo, S.	4.2	13.0	29.13, rising from 29.05 to 29.17.	4.2	14.0	29.33, variable....	Fine, cloudy, light wind.	Overcast, misty, light wind.	Halo of 22°, inner edge reddish.
21	April 5, 8:30 p.m.	Annulus, S..	4.2	14.0	29.34, variable.....	7.7	15.0	29.23, falling from 29.36 to 29.11.	Cloudy, misty, light wind.	Cloudy, windy, heavy showers.	With undefined edge, intermittent, extending to 1 d.
22	April 6, 6 p.m.	Rainbow, S..	......	......	....	.....	.....	....	....	....	Double, inner one very strong, with four inner supernumerary purple bands, with green between (the first green band only visible), outer bow faint, with purple edge outside. Distance (not measured) equal to about eight times width of principal rainbow.
23	April 13, 6 p.m.	Annulus, S..	7.6	13.9	29.29, variable.....	6.2	10.8	29.43, variable	Fine, clear, light wind.	Overcast, rain......	With undefined edge, intermittent, yellow, extending 1 d.
24	April 20, 8:45 p.m.	Halo, S.....	2.0	12.2	29.90, variable.....	7.6	11.4	29.78, falling from 29.88 to 29.70.	Fine, light wind....	Overcast, rain all the time.	Halo of 22°, inner edge reddish, outer edge bluish.
25	April 22, 2:30 p.m.	Halo, S.....	6.0	11.3	29.86, rising from 29.70 to 30.03.	6.1	15.4	30.08, variable	Fine, still..........	Overcast, strong wind.	Halo of 22°, inner edge reddish, outer edge bluish, lasted 20 minutes.
26	April 22, 4 p.m.	Halo, S.....	6.0	15.4	29.89, rising from 29.70 to 30.05.	6.1	18.0	30.08, variable	Fine, still..........	Cloudy, strong wind, a little rain.	Halo of 22°, faint, milky, transient.
27	April 22, 12 midnight	Annulus, M.	6.0	15.4	30.00, rising from 29.80 to 30.12.	6.1	18.0	30.09, variable .. .	Fine, cloudy, light wind.	Cloudy, strong wind.	Undefined edge, extending 1¼ d., outer edge slightly reddish.
28	April 23, 6 p.m.	Annulus, S..	6.1	18.0	30.09, variable.....	7.8	21.3	30.08, steady......	Cloudy, windy.....	Cloudy, light wind; fine and warm.	Undefined edge, to ½ d.; above and below a rudiment of pillar up to 1 d.
29	April 25, 10 p.m.	Corona, M..	11.0	18.0	30.01, falling from 30.09 to 29.96.	7.6	8.6	29.80, falling from 29.97 to 29.60.	Overcast, dull, light wind.	Pouring rain all day	No definite corona, only a reddish tinge around the moon, on the clouds passing on it.
30	April 26, 10 p.m.	Annulus, M.	7.6	8.6	29.80, falling from 29.97 to 29.60.	3.2	10.8	29.61, steady	Overcast, still.......	Fine, light wind; small storm, strong wind and pouring rain.	Moon silvery white, orange annulus, fairly sharp edge, width ½ d., intermittent.
31	April 27, 11 p.m.	Annulus, M.	3.2	10.8	29.61, steady......	1.8	10.7	29 64, variable.....	Cloudy, light wind..	Cold, cloudy, strong wind.	Fairly sharp edge, width ½ d.; outside, another with undefined edge.
32	May 1, 7 p.m.	Annulus, S..	4.4	10.0	29.53, variable....,	5.5	13.3	29.33, variable.....	Cold, cloudy, windy.	Cloudy, gale, heavy rain.	With undefined edge, extending to 1 d.
33	May 5, noon.	Halo, S.....	5.4	16.0	29.55, variable.....	8.9	16.6	29.47, variable.....	Warm, cloudy, light wind.	Overcast, strong wind, rain.	Halo of 22°, faint, partial, milky, intermittent.
34	May 8, 12:30 p.m.	Halo, S	7.0	11.7	29.68, variable.....	7.0	19.8	29.73, variable.....	Warm, still, veiled sky.	Overcast, pouring rain, strong wind.	Halo of 22°, milky.
35	May 12, 5 p.m.	Halo, S	14.8	27.0	29.60, steady	14.4	19.5	29.64, variable....	Hot, light wind, veiled sky.	Overcast, rain......	Halo of 22°, milky.
36	May 12, 7:30 p.m.	Annulus, S..	14.8	27.0	29.60, variable.....	14.4	19.5	29.65, variable.....	Hot, light wind, cloudy.	Overcast, rain.......	Undefined edge, extending to ¼ d.
37	May 23, 10 p.m.	Halo and annulus, M.	10.8	21.1	29.47, variable.....	10.9	20.1	29.57, rising from 29.47 to 29.76.	Warm, cloudy, light wind.	Overcast, distant thunderstorm, rain.	Halo of 22°, milky; annulus with undefined edge extending to ½ d.
38	May 24, 8 p.m.	Annulus, M.	10.9	20.1	29.55, rising from 29.45 to 29.74.	8.3	21.5	29.78, variable.....	Fine, warm, cloudy.	Sky rapidly veiled, then quite pure, then overcast, some rain.	Visible before sunset, 8 p.m.; pale, defined edge, wider on limb than on terminator. 8:15 p.m., orange, with red edge; 8:30 p.m., wider, bright orange-red edge, outer purplish grey, annulus extending to 1 d.
39	May 24, 9:30 p.m.	Halo, M.....	10.9	20.1	29.57, rising from 29.47 to 29.76.	8.3	21.5	29.79, variable.....	Warm, veiled sky, still.	Sky rapidly veiled, then quite pure, then overcast, some rain.	Halo of 22°, milky, very faint.
40	May 31, 12:30 p.m.	Halo, S......	12.1	16.7	29.70, falling from 29.87 to 29.50.	12.1	20.1	29.32, falling from 29.50 to 29.25.	Hot, cloudy, light wind.	Overcast, rain; thick fog; thunderstorm pouring rain.	Halo of 22°, milky.
41	June 6, 5:30 p.m.	Rainbow, S..	......	......	....	.....	.....	....	....	....	Double, faint. Inner one with two inner supernumerary bows.
42	June 8, 8 8 p.m.	Annulus, S .	12.6	21.5	29.73, steady	13.1	25.0	29.59, falling from 29.70 to 29.46.	Hot, cloudy, light wind.	Warm, cloudy; overcast, windy, rain.	With undefined edge extending to ¼ d.
43	June 11, 3:45 p.m.	Halo, S.....	11.3	21.5	29.67, variable.....	14.1	20.1	29.56, falling from 29.70 to 29.48.	Hot, cloudy, still.. .	Overcast, windy, rain; fine and sunny with strong wind.	Halo of 22°, milky, inner edge slightly red; lasted 2 hours.
44	June 11, 6 p.m.	Annulus, S..	11.3	21.5	29.68, variable.....	14.1	20.1	29.52, variable.....	Hot, overcast, still..	Windy, rain; fine, sunny, strong wind, rain.	With undefined edge, white, extending to ¼ d.
45	June 17, 10 p.m.	Annulus, M.	7.6	19.5	29.93, falling from 29.95 to 29.88.	11.0	18.7	29.78, falling from 29.88 to 29.69.	Warm, cloudy, still.	Overcast, strong wind, some rain.	Undefined edge, very faint, eccentric.
46	June 18, 10 p.m.	Corona, M..	11.0	18.7	29.78, falling from 29.88 to 29.69.	10.0	20.0	29.78, variable.....	Warm, cloudy and starry, light wind, a passing shower.	Cloudy, strong wind.	Faint, intermittent, color from orange to red; distance of outer edge from limb, from 3 to 4 d.; one moment elliptical (minor axis in line joining the horns); one moment eccentric.
47	June 20, 1 p.m.	Halo, S.....	11.1	20.0	29.76, variable.....	11.7	21.7	29.57, variable.....	Fine, sky veiled by cirri, fresh wind.	Overcast and dirty, very strong wind.	Halo of 22°, inner edge reddish, outer edge bluish.
48	June 20, 10 p.m.	Annulus, M.	11.1	21.7	29.67, falling from 29.82 to 29.48.	11.7	20.5	29.62, variable.....	Overcast, stormy, strong wind.	Cloudy, very strong wind.	Undefined edge, extending to ¾ d.
49	June 22, 11 p.m.	Corona, M .	11.8	20.3	29.70, variable.....	10.5	19.0	29.73, rising from 29.67 to 29 80.	Fine, pure sky slowly covering, windy.	Overcast, strong wind, rain.	Faint, transient, reddish, from 5 to 6 d.
50	June 24, 10:30 p.m.	Corona, M..	10.1	16.9	29.65, falling from 29.79 to 29.51.	9.7	16.6	29.53, variable.....	Pure sky, with passing clouds, strong wind.	Overcast, fresh gale during the night, then wet all day.	Intermittent, variable, sometimes very wide, from 4 to 6 d., and orange; at other times from 2 to 3 d., reddish, with somewhat sharper edges.
51	June 28, 1 p.m.	Corona, S...	12.2	20.7	29.74, steady......	9.3	19.5	29.76, variable.....	Cloudy, light wind.	Overcast, misty, gloomy, light wind (severe thunderstorm, pouring rain).	Not directly visible. Seen and measured on virtual image produced by convex face of a bi-convex lens, also on the projected image (real). Reddish, from 2 to 3 d.
52	June 28, 4:30 p.m.	Halo and annulus, S...	12.2	19.5	29.75, steady......	9.3	19.4	29.75, variable....	Veiled sky, light wind.	Overcast, misty, gloomy, rain, light wind (severe thunderstorm, pouring rain).	Halo of 22°, yellowish; at 5 p.m. annulus extending to 1 d., halo still faintly visible.

DEDUCTIONS.

Annuli.—Fifteen observed.

Sun, 8. Three followed by rain, four by wind and rain, one by fine weather.

Moon, 7. Two followed by rain, three by wind, two by wind and rain.

Coronas.—Five observed.

Sun, 1. Followed by rain.

Moon, 4. One followed by rain, three by wind and rain.

Halos (single).—Thirteen observed.

Sun, 11. Three followed by rain, one by rain and fog, two by wind, four by wind and rain, one by fine weather (misty and overcast).

Moon, 2. Both followed by rain.

NOTE.—Corona No. 51 and annulus and halo No. 52 are included amongst the phenomena followed by meteorological disturbances, altho the storm followed later than twenty-four hours; because from the time of the observations there was a visible suspense before the imminent storm.

GENERAL REMARKS.

Altogether, of thirty-one distinct individual displays (the rainbows being neglected), there were—

Followed by rain, 11.

Followed by wind and rain, 11.

Followed by wind alone, 6.

Followed by rain and fog, 1.

Followed by fine weather, 2.

The failures are a halo and an annulus, both of the sun.

The observations of the second quarter confirm the results obtained during the first quarter, both as to the indication of approaching disturbances given by halos, coronas, and annuli, and as to the distinction between the latter and the coronas, together with which they never appear, while they are frequently seen simultaneously with halos.

Despite one failure, the annulus seems the best guide as to the following meteorological conditions. Annuli generally show themselves in perfectly fine weather, the next day being at first without the slightest sign of anything but a glorious day, to end with a veiled sky becoming rapidly overcast and with rising wind and rain. On the other hand, halos and coronas are visible only with a veiled and cloudy sky, when the weather is generally visibly unsettled and becoming rapidly worse.

The diameters of the coronas seem to depend on the kind of clouds; the thicker and the more tightly packed, the smaller the diameter. In some cases, with clouds of various concentration drifting before the moon, the corona produced was elliptical or eccentric, various parts being probably produced by vesicles of water vapor of different sizes, throwing the respective arcs of the corona at various distances from the limb.

Once, while cleaning in the open the object glass of my $3\frac{1}{2}$-inch telescope, I saw in it a well-defined corona of the sun, tho on looking directly the dazzled eye could not distinguish it. Since then I am able to observe solar coronas with ease, and to take very good measurements of them. On looking in the lens so as to see the sun by reflection, four images are produced, one by each face of the achromatic system. The inner face of the biconvex lens gives too bright an image, but the outer face gives a virtual image of greatly diminished brightness which well shows the coronas when they are present. A large, long-focus lens gives better results than a small, short-focus one. The direct (real) image obtained by projection on a piece of white paper can be used successfully when only the latter kind of lens is available.

The summer hitherto has been very bad, being wet and windy, hence what I think will be an abnormally large harvest of these optical phenomena. I am endeavoring now to establish some correlation between the state of the sky and the appearance of the phenomena, and the particular type of weather and degree of disturbance corresponding to each. For this a large number of observations must be gathered. I hope that some others may be induced to take up the work and help to elucidate many points which are marked in my observation book with a query. I think psychrometric observations should be useful, more useful than thermometric ones, but as yet I can not undertake them.

PURGING THE LISTS.

A small percentage of our correspondents cause themselves and the Publications Division not a little annoyance by not attending promptly to the "penalty" postal card sent annually, asking each to state whether or not he wishes to continue receiving the MONTHLY WEATHER REVIEW. A standing order requires all mailing lists to be revised annually, and this is accomplished by the postal-card method with the least possible trouble to all concerned.

NOTES ON THE JAMESTOWN TERCENTENNIAL EXPOSITION.

By JAMES H. SPENCER, Observer in charge of U. S. Weather Bureau exhibit.

One of the most creditable exhibits at the Jamestown Exposition was the aeronautical display, made by the Aero Club of America under the able direction of Mr. Israel Ludlow. The exhibit of balloons, dirigible balloons, aeroplanes, kites, models of flying machines, photographs, etc., was very complete and more attractively displayed than at any other exposition I have ever attended. Numerous dirigible balloon flights were accomplished by Mr. Lincoln Beechey and others. Mr. Ludlow upon several occasions attempted experimental flights with his aeroplane; these, however, were unsuccessful, due apparently to a lack of launching facilities. During the exposition Mr. Ludlow and his assistants gave instructive lectures on aeronautics.

The Weather Bureau exhibit at the Jamestown Exposition, tho somewhat less elaborate than at St. Louis and Buffalo, did not differ greatly in character from the exhibits at these two former expositions.[1]

Much interest was taken in the Jamestown display, particularly the instrumental portion, which comprised one of the few "live" exhibits in "Government Building A." The Bosch-Omori seismograph displayed by the Weather Bureau was perhaps more frequently inspected by visitors than any other single exhibit in the building. The general desire on the part of visitors to see this instrument reflects the great interest in seismology that has been aroused by the recent severe earthquakes and the reports in the public press of the records obtained by the Weather Bureau.

The Weather Bureau exhibit was arranged in four sections, as follows:

Instrumental.—All the important instruments of the Weather Bureau were shown in this section, many of them in operation.

Aerial.—This section consisted of a Weather Bureau kite and reel and considerable self-recording and other apparatus for use in investigating upper air conditions by means of kites and balloons.

Educational.—On a large glass weather map were charted daily the weather conditions in all sections of the country, as shown by telegraphic reports. In this section were also displayed a large relief map and several smaller maps of the United States, showing the mean annual temperature and the average annual precipitation, sunshine, and other data. A

[1] A detailed description of the Weather Bureau exhibit at the Buffalo Exposition appeared in the Review for June, 1901, (Vol. xxix, p. 259-262 and plates I-IV) and of the St. Louis Exposition in the Review for September, 1904, (Vol. xxxii, p. 411-413.)

meteorological library was maintained, and the various text-books exhibited were frequently consulted by teachers and others.

Photographs.—A large number of beautiful photographs, showing cloud and fog studies, snow crystals, floods, etc., were attractively displayed.

A model storm-warning tower and four large storm-warning lanterns were among the additional equipment exhibited.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

H. H. KIMBALL, Librarian.

The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.

Aachen. Meteorologisches Observatorium.
Das neuerbaute meteorologische Observatorium zu Aachen. Karlsruhe. 1901. 21 p. f°.

Hobbs, William Herbert.
Earthquakes, an introduction to seismic geology. New York. 1907. xxx, 336 p. 12°.

Kühl, Wilhelm.
Der jährliche Gang der Bodentemperatur in verschiedenen Klimaten ... Inaug.-Diss... Berlin. [Würzburg. 1907. 66 p. 8°.]

Mathesius, —.
Die Kayser'schen Wolkenhöhen-Messungen der Jahre 1896 und 1897. Danzig. 1907. p. 49-137. 4°. (S.-A. Schriften. Danzig. N. F. 12 Bd. 1. Heft. Danzig. 1907.)

Platania, Giovanni.
I fenomeni in mare durante il terremoto di Calabria del 1905. Modena. 1907. 41 p. 8°.

Prussia. Königliche preussische aeronautische Observatorium. Lindenberg.
Ergebnisse der Arbeiten ... 1906. 2. Band. Braunschweig. 1907. xiv, 176 p. f°.

Raulin, V.
Observations pluviométriques faites dans la France méridionale (sud-ouest, centre et sud-est) de 1704 à 1870... Paris. 1876. ix, 1044 p. 8°.
Observations pluviométriques faites dans la France septentrionale (est, Neustrie et Bretagne) de 1688 à 1870... Paris. 1881. xv, 810 p. 8°.

Thomson, J. J.
The corpuscular theory of matter. London. 1907. vi, 172 p. 8°.

RECENT PAPERS BEARING ON METEOROLOGY.

H. H. KIMBALL, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——

American aeronaut and aerostatist. St. Louis. v. 1.
Steichmann, H. Hildebrandt's Icelandic observations. (Oct., 1907.) p. 23-24.
Rotch, A. Lawrence. Use of registration balloons in obtaining meteorological conditions at great heights. (Nov.-Dec., 1907.) p. 17-18.

American geographical society. Bulletin. New York. v. 39. Dec., 1907.
Ward, R. DeC. Jamaica negroes and climate. [Note.] p. 744.
Ward, R. DeC. Weather and railroads. p. 717-748.

Electrical world. New York. v. 50. Dec. 21, 1907.
Carpenter, D. S. The rolling of thunder. p. 1211-1213.

Geographical teacher. London. v. 4. 1907.
Shaw, W[illiam] N[apier]. The general circulation of the atmosphere. [Popular presentation of the subject in the light of recent theories.] p. 52-64.

Great Britain. Meteorological office. Monthly meteorological charts. Indian ocean. Jan., 1908.
—— Results of meteorological observations in the Persian Gulf and the Gulf of Oman. 1 p.

London, Edinburgh, and Dublin philosophical magazine. London. 6 series. v. 14. Dec., 1907.
Eve, A. S. On the amount of radium emanation in the atmosphere near the earth's surface. p. 724-733.
Poynting, J. H. On Professor Lowell's method for evaluating the surface temperatures of the planets, with an attempt to represent the effect of day and night on the temperature of the earth. p. 749-760.

Manchester geographical society. Journal. London. v. 23. Pt. 2. 1907.
Swallow, R. W. A glimpse at western China; the province of Shansi. [Including brief account of the climate, p. 57.] p. 49-59.

Science. New York. New series. v. 27. Jan. 10, 1908.
McNair, F. W. Report of the general secretary of the American association for the advancement of science for the Chicago meeting, convocation week, 1907-8. [Includes reports of the committee on seismology.] p. 41-49.
Reid, Harry Fielding. The meeting of the International seismological association. p. 74-76. [Includes reports of the committee on seismology.]

Scientific American supplement. New York. v. 65. Jan. 11, 1908.
Arrhenius, Svante. Auroras and magnetic storms. Caused by solar dust in the earth's atmosphere. p. 31.

Scottish geographical magazine. Edinburgh. v. 23. Dec., 1907.
Newbigen, Marion I. The study of the weather as a branch of nature knowledge. p. 627-648.

Scottish meteorological society. Journal. Edinburgh. v. 14. 3 ser. no. 24.
Mitchell, Arthur, and others. Memorial notices of Alexander Buchan. p. 101-118. [Includes portrait and list of writings.]
Bell, Herbert. Thunderstorms at the Ben Nevis observatories and on the Scottish coasts. p. 119-133.
Lempfert, R. G. K. The daily weather report. p. 134-140. [Description of British and foreign daily weather maps.]
Richardson, Ralph. Rain-producing east winds and their influence on the summer of 1907. p. 141-143.

Symons's meteorological magazine. London. v. 42. Dec., 1907.
Ellis, William. Greenwich air temperature. p. 209-214.

Aérophile. Paris. 15 année. Déc., 1907.
Aubry, Roger. L'auréole des aéronautes. p. 338. [Describes aureole observed around the shadow of a balloon on a cloud.]

Ciel et terre. Bruxelles. 28 année. 1 déc. 1907.
Vincent, J. Le grain du 3 août 1905. p. 445-450.
—— Dispersion du brouillard et des fumées par l'électricité. p. 489-491.
Vincent, J. Le ballon-sonde belge du 25 juillet 1907. p. 495-500. [Account of the highest ascent ever made with sounding-balloon. Remarks on temperature inversion.]

France. Académie des sciences. Comptes rendus. Paris. Tome 145.
Demoussy, E. Influence de l'état hygrométrique de l'air sur la conservation des graines. p. 1194-1196. (Dec. 9, 1907.)
Nodon, Albert. Recherches sur les variations du potential terrestre. p. 1370-1371. (Dec. 23, 1907.) [Variations in earth potential as prognostics of atmospheric and seismic disturbances.]

Journal de physique. Paris. 4 série. Tome 6. Déc. 1907.
Schuster, Arthur. Sur quelques phénomènes électriques de l'atmosphère et leurs relations avec l'activité solaire. p. 937-950.

Mogimont. Publications populaires de la Station météorologique Mons. no. 5.
Bracke, A. La prévision locale du temps. Le polymètre Lambrecht. p. 123-132.
Le Paige, L. A propos de l'incendie d'Anvers. p. 135-137.

Nature. Paris. 36 année. 4 jan. 1908.
—— Janssen. p. 78-79.

Société belge d'astronomie. Bruxelles. 12 année. Nov., 1907.
Arctowski, Henryk. Variations de longue durée de divers phénomènes atmosphériques. p. 328-340.
Agamennone, G. Théorie des tremblements de terre. p. 340-345.
Lagrange, E. La propagation des ondes sismiques longues. p. 347-348.
D., A. La méthode du "vent normal" dans la prévision du temps. p. 366-367.

Société météorologique de France. Annuaire. Paris. Oct., 1907.
Brunhes, B. Sur l'enregistrement des courants telluriques au Puy-de Dome et la perturbation magnétique du 9 au 10 février 1907. p. 181-182.
Marchand, E. Observations du courant tellurique sur la ligne télégraphique de l'Observatoire du Pic du Midi. p. 183-186.
Moureaux, Th. Nouvelles déterminations magnétiques dans la région du bassin de Paris. p. 188-195.

Société ouralienne d'amateurs des sciences naturelles. Bulletin. Ekatherinburg. Tome 26. 1907.
Abels, H[ermann Fedorovic]. Précipitations atmosphériques dans le gouvernement de Perm pendant l'année 1903, 1904, 1905. p. 51-62.

Königliche preussische Akademie der Wissenschaften. Sitzungsberichte. Berlin. 1907. 50.
Zimmermann, H. Ueber grosse Schwingungen im widerstehenden

Mittel und ihre Anwendung zur Bestimmung des Luftwiderstandes. p. 874–907.

Annalen der Hydrographie und maritimem Meteorologie. Berlin. 35 Jahrgang. 1907.

Stach, E. Ein neuer Apparat zum Registrieren von Luft- oder Gasgeschwindigkeiten. p. 477–479.

Meteorologische Zeitschrift. Braunschweig. Band 24. Dez. 1907.

Hann, J. Ergebnisse der meteorologischen Beobachtungen am Ätna-Observatorium. p. 529–534.

Osthoff, H. Streifenwolken. p. 534–540.

Quervain, A. de. Pilotballonanvisierungen in Zürich während der Hochdruckperiode vom 14. bis 25. Januar 1907. p. 540–546.

Brückmann, W. Das Vektorazimut beim Beginn magnetischer Störungen. p. 546–548.

Hann, J. A. Schmauss über die im Jahre 1906 von der K. b. met. Zentralstation veranstalteten Registrierballonfahrten. p. 549–550.

Schmidt, A. Die barometrische Tendenz. p. 550–552. [Proposes that barometer change in preceding 2 hours be included in the weather telegram.]

Smirnow, D. Einige Bemerkungen zu dem Artikel von L. Gorczynski "Ueber die Wirkung der Glashülle bei den aktinometrischen Thermometern." p. 552–555.

—— Ueber das Klima an der Südgrenze der Sahara im französischen Sudan. p. 555.

Schubert, J. Der Niederschlag in der Letzlinger Heide. p. 555–558.

H[ann], J. O. Fassig über das Klima der Bahama-Inseln. p. 558–559. [Abstract.]

Hann, J. R. Billwiller (sen.): Der tägliche Gang des Luftdruckes in verschiedenen Seehöhen in der Nordost-Schweiz. p. 559.

Rheden, Joseph. Wolkenhöhenmessungen mit Hilfe der Scheinwerferanlage des wiener Leuchtbrunnens, angestellt im Jahre 1907. p. 561–563.

Hann, J. Der Wettersturz vom 15. bis 16. August 1907 und die alpinen Unglücksfälle. p. 563–565.

Trabert, Wilh. Die Temperaturverteilung in grossen Höhen. p. 565.

D., A. T. Okada über die Geschwindigkeit fallender Regentropfen. p. 565–566.

Hergesell, H. Die Erforschung der freien Atmosphäre über den Polargebieten. p. 566–567.

—— Resultate der meteorologischen Beobachtungen an der Versuchsstation Pasaruan (Ostjava, Nordküste). p. 568–570.

—— Ergebnisse meteorologischer Beobachtungen auf den Kanarischen Inseln. p. 572.

—— Regenfall auf Grenada. p. 574.

—— Pyrheliometrische Messungen in Madrid. p. 574–575.

Weltall. Berlin. 8. Jahrgang. 1907 Dez. 1.

Braun, Joh. Ueber die Kälterückfälle im Frühjahr. p. 78–82, 95–99.

Società geografica italiana. Bollettino. Roma. Ser. 4. v. 8. Dic. 1907.

Barrata, Mario. Il nuovo massimo sismico calabrese (23 ottobre 1907). p. 1259–1264.

Hemel en dampkring. Den Haag. 5 Jahrgang. Dec., 1907.

—— Ijslandsche weertelegrammen. p. 112–113.

—— Dr. Maurits Snellen. p. 114.

Arkiv für matematik, astronomi och fysik. Uppsala. Band 3. Häfte 3–4. 1907. No. 25.

Sandström, J. W. Ueber die Temperaturverteilung in den allerhöchsten Luftschichten. 6 p.

SPECIFIC GRAVITY OF SNOW.

By M. E. T. GHEURY. Dated Eltham, England, August 3, 1907.

I had made preparations to ascertain, during the winter of 1906–7, the weight of snow that can accumulate on suspended wires of various diameters. Owing to lack of favorable meteorological conditions and to the fact that I was away from home during the only heavy snowfall in London, I had to be content with simply taking measurements of the specific gravity of snow. This was done by placing a shallow rectangular tray with vertical edges on the ground and leaving it till well covered by the snow. On lifting it carefully it was found that the shearing of the snow took place in a very regular manner and left on the tray a neat rectangular solid of snow, the latter being undisturbed by the process and in the same state as the snow on the surrounding ground.

January 24, 1907. After two days' hard frost, snow fell in very fine powder from morning till evening, when the measurements were taken. It lay frozen in a powder without any cohesion, but could, however, be made into balls by strong compression, undergoing considerable reduction of volume during the process. The snowfall had been insufficient to completely cover the tray, and near one edge a ridge of snow had been formed by the wind, while on the opposite side the snow did not quite reach the side of the tray, there being a gap of about one-twentieth of an inch. The excess due to the ridge was ascertained to approximately compensate the deficiency due to the gap.

Size of tray, 23.3 cm. × 10.9 cm. = 254 sq. cm.

Weight of tray, 87.81 grams.

Average depth of snow, 0.9 cm. (ascertained by placing vertically in the snow, at various places, a small divided scale).

Weight of snow, 17.48 grams.

Specific gravity of snow, 0.076.

Depth required for a load of 1 kilogram per square meter, 13.2 mm.

February 4, 1907. Snow fell during the afternoon and the evening. It was fluffy, adherent, forming a compact mass without much pressure, but undergoing a considerable reduction in volume during the process. Instead of being formed of very small grains as on the 24th, it was made of fine hexagonal stars and fine needles of ice, with evidently many air spaces. A cat had left a footprint in one corner of the tray. As it might have carried some snow away with it, the trodden part was cut carefully away, leaving an effective area of 169 sq. cm.

Average depth of snow, 2.2 cm.

Weight of tray, 86.10 grams. (It had become rusty and had been cleaned the day before.)

Weight of snow, 19.52 grams.

Specific gravity of snow, 0.052.

Depth required for a load of 1 kilogram per square meter, 19.2 mm.

By collecting some snow on a sloping roof and carefully measuring the dimensions of the solid, its volume being found to be 1677.6 cm^3, with a weight of 60.09 grams, the specific gravity of the snow was found to be 0.036. This method is, however, subject to inaccuracies, as it is very difficult to measure the volume of the solid space occupied by the snow in these conditions.

ATMOSPHERIC DUST IN THE GULF OF MEXICO.

By E. BANVARD, second officer Amer. S.S. *Monterey*, Capt. Arthur Smith, of the New York and Cuba Mail Steamship Company, on voyage from Vera Cruz to New York.

On January 13, 1908, after the blow of January 12, we found the ship covered with a fine gray or white dust, especially the masts and rigging, something I have never seen before during a gale in the Gulf. The wind was west. The dust must have been carried from the coast of Mexico, or possibly from Texas, by an upper current of air. We were hove to about fifteen miles north of Progreso.

STUDIES OF FROST AND ICE CRYSTALS.

By WILSON A. BENTLEY. Dated Jericho, Vt., May 28, 1906. Revised July, 1907.

(Continued from November Review.)

TABLE 4.—*List of photographs, with dates and references to the text.*

Photograph number.	Section number.	Magnification.	Date.	Photograph number.	Section number.	Magnification.	Date.
0	11	2	Feb., 1904	93	50, 52	20	Mar. 10, 1904
1	11	15	Dec., 1884	94	54	20	Mar. 10, 1904
2	11	30	Jan., 1885	95	32	8	Mar. 16, 1904
3	32	4	Jan., 1885	96	17	8	Mar. 28, 1904
4	32	6	Feb., 1885	97	17	8	Mar. 28, 1904
5	32	28	Jan., 1885	98	17	8	Mar. 29, 1904
6	11	25	Jan., 1885	99	17	9	Mar. 29, 1904
7	12	35	Feb., 1885	100	31, 44	6	Dec. 4, 1904
8	13	25	1886	101	50, 53	6	Dec. 4, 1904
9	11	25	1886	102	32	8	Dec. 6, 1904
10	32	26	1886	103	32, 44	8	Dec. 6, 1904
11	14	20	1886	104	32	6	Dec. 9, 1904
12	11	25	1886	105	32	6	Dec. 10, 1904
13	15	8	1888	106	32, 44	8	Dec. 11, 1904
14	15	8	1888	107	31, 44	6	Dec. 11, 1904
15	14	8	1888	108	31, 44	8	Dec. 11, 1904
16	14	8	1888	109	32	6	Dec. 11, 1904
17	44	30	1888	110	15	4	Dec. 13, 1904
20	12	16	1899	111	15	4	Dec. 13, 1904
21	32	8	1898	112	32	6	Dec. 13, 1904
22	32	6	1899	113	50	1/4	Dec. 13, 1904
23	32	6	1889	115	33	8	Dec. 18, 1904
24	14	6	1889	116	20	12	Dec. 18, 1904
25	31	1/3	1890	117	33, 36	6	Dec. 18, 1904
26	11	25	1892	118	11	20	Dec. 18, 1904
27 A	16	24	1893	119 A	32	8	Dec. 19, 1904
27 B	19	12	Nov. 14, 1905	119 B	32	6	Feb. 25, 1907
27 C	19	25	Nov. 14, 1905	120	38	6	Dec. 20, 1904
28 A	40	1	Dec. 21, 1899	121	38	6	Dec. 20, 1904
28 B	40	1	Dec. 21, 1899	122	32, 44	6	Dec. 24, 1904
29	31	1/2	1900	123	32	4	Dec. 24, 1904
30	33	8	1901	124	32	6	Dec. 24, 19 4
31	33	8	1901	125	32, 44	6	Dec. 24, 1904
32	36, 39	8	1902	126	31	4	Dec. 25, 1904
33	12	30	1902	127	38	8	Dec. 26, 1904
34	12	30	1899	128	32, 44	6	Dec. 28, 1904
35 A	19	12	1902	129	36	8	Dec. 30, 1904
36 A	18, 19	2	Oct. 22, 1905	130	33	6	Jan. 3, 1905
36 B	18	12	Mar. 28, 1906	131	33	6	Jan. 3, 1905
36 C	18	12	Mar. 28, 1906	132	33, 38	6	Jan. 3, 1905
36 D	18	16	Oct. 7, 1905	133	50, 51	15	Jan. 6, 1905
36 E	18	2	Oct. 26, 1905	134	50, 51	15	Jan. 6, 1905
37	20	10	1902	135	50, 51	15	Jan. 5, 1905
38 A	11	20	Dec. 4, 1903	136	50, 51, 52, 53	1/3	Jan. 5, 1905
38 B	11	20	Dec. 4, 1903	138	50, 51, 52	1/3	Jan. 5, 1905
38 C	11	2	Nov. 21, 1905	139	50, 51, 52	2	Jan. 5, 1905
38 D	11	2	Nov. 21, 1905	140	50, 51, 52, 53	1/3	Jan. 5, 1905
40	32	6	1903	142	50, 51, 52	2	Jan. 5, 1905
42	32, 33	6	Dec. 6, 1903	143	32	4	Jan. 7, 1905
43	32	6	Dec., 1903	144	32, 44	6	Jan. 7, 1905
44	31	1/3	Jan. 17, 1904	145 A	32, 35	8	Jan. 13, 1905
45	31	1/3	Jan. 25, 1904	145 B	32	6	Dec. 18, 1906
46	11	8	Jan. 19, 1904	146	33	6	Jan. 13, 1905
47 A	13	15	Jan. 19, 1904	147	33	6	Jan. 13, 1905
47 B	13	20	Jan. 19, 1904	148	33, 44	8	Jan. 13, 1905
48	31, 32, 44	1/3	Jan. 21, 1904	149	54	15	Jan. 13, 1905
49	50, 51	40	Jan. 25, 1904	150	50, 53	1/4	Jan. 14, 1905
50	50	40	Jan. 25, 1904	151	50	1/4	Jan. 14, 1905
51	50	1/3	Jan. 25, 1904	152	50	8	Jan. 14, 1905
52	50	1/3	Jan. 25, 1904	153	54	8	Jan. 14, 1905
53	36	8	Jan. 26, 1904	154 A	16, 34	8	Jan. 15, 1905
54	32	8	Jan. 26, 1904	154 B	16, 34, 35	8	Jan. 15, 1905
55	32	6	Jan. 26, 1904	155	11	20	Jan. 23, 1905
56	32	6	Jan. 27, 1904	156	37	30	Jan. 24, 1905
58 A	34, 36	8	Feb. 1, 1904	157	37	20	Jan. 24, 1905
58 B	34, 36, 39	6	Feb. 1, 1904	158	14	1/10	Jan. 24, 1905
59	34, 36, 39	8	Feb. 2, 1904	159	14	2	Feb. 5, 1905
60	32	8	Feb. 2, 1904	160	14	1/10	Jan. 24, 1905
61	12	35	Feb. 2, 1904	161	16, 35	25	Jan. 25, 1905
62	50, 51, 52	60	Feb. 4, 1904	162	22	10	Jan. 25, 1905
63	50	1/3	Feb. 5, 1904	163	22	10	Jan. 25, 1905
64	32	6	Feb. 8, 1904	164	50, 53, 54	8	Jan. 25, 1905
65	32	6	Feb. 8, 1904	165	54	1/2	Jan. 25, 1905
66 A	50, 51	1/3	Feb. 8, 1904	166	32, 40	6	Jan. 28, 1905
66 B	32	8	Feb. 8, 1904	167	32	4	Jan. 28, 1905
67	32	1/3	Feb. 8, 1904	168	15	8	Jan. 31, 1905
68 A	50, 51	30	Feb. 10, 1904	169	15	8	Jan. 31, 1905
68 B	50, 51	30	Feb. 10, 1904	170	15	1/10	Jan. 31, 1905
69	32, 33	6	Feb. 15, 1904	171	36	32	Feb. 1, 1905
70	32	8	Feb. 15, 1904	172	15	3	Feb. 1, 1905
72	50, 51	30	Feb. 16, 1904	173	15	3	Feb. 1, 1905
73	33	6	Feb. 16, 1904	174	15	3	Feb. 1, 1905
74	50, 52	60	Feb. 26, 1904	175	34	3	Feb. 2, 1905
75	50	60	Feb. 26, 1904	176	34	1/3	Feb. 3, 1905
77	32	6	Mar. 4, 1904	177	33	1/3	Feb. 3, 1905
78	50	40	Mar. 4, 1904	178	34	3	Feb. 3, 1905
79	50, 52	30	Mar. 4, 1904	179	33	4	Feb. 3, 1905
80	44	60	Mar. 4, 1904	180 A	36	24	Feb. 3, 1905
81	44	60	Mar. 4, 1904	180 B	36	4	Feb. 3, 1905
82	50	35	Mar. 4, 1904	182	50, 53	1/4	Feb. 3, 1905
83	50	30	Mar. 4, 1904	183	50. 53	1/4	Feb. 3, 1905
84	54	16	Mar. 4, 1904	185	31	1	Feb. 3, 1905
85	32	8	Mar. 7, 1904	186	31	1/4	Feb. 3, 1905
86	38	6	Mar. 9, 1904	187	31	2/3	Feb. 4, 1905
87	54	20	Mar. 10, 1904	188	34	3	Feb. 5, 1905
88	50, 51, 52	25	Mar. 10, 1904	189	50, 52	2	Feb. 5, 1905
89	50	25	Mar. 10, 1904	190	14	6	Feb. 5, 1905
91	50	1/3	Mar. 10, 1904	191	11	6	Feb. 5, 1905
92	50, 54	25	Mar. 10, 1904	192	31	4	Feb. 5, 1905

TABLE 4.—*List of photographs, with dates, etc.*—Continued.

Photograph number.	Section number.	Magnification.	Date.	Photograph number.	Section number.	Magnification.	Date.
193	31	1	Feb. 8. 1905	238	68	3	Feb., 1906
194	32	1/3	Feb. 8, 1905	239 A	68	1	Feb., 1906
195	33	6	Feb. 8, 1905	239 B	68	1/3	Feb., 1906
196 A	33	6	Feb. 8, 1905	240	68	4	Feb., 1906
196 B	23	6	Feb. 8, 1905	241	69, 70	4	Feb., 1906
199	12	20	Feb. 25, 1905	242	69	4	Feb., 1906
201	22	10	Feb. 25, 1905	243	69	4	Feb., 1906
202	32	2	Mar. 2, 1905	244	69	4	Feb., 1906
203	32	1	Mar. 2, 1905	245	69	4	Feb., 1906
204	32	8	Mar. 5, 1905	246	69	4	Feb., 1906
205	32	8	Mar. 5, 1905	247	69	4	Feb., 1906
206	22	15	Mar. 5, 1905	248	69	3	Feb., 1906
207 A	22, 23	15	Mar. 9, 1905	249	69	4	Feb., 1906
207 B	23	6	Mar. 9, 1905	250	70, 71	4	Feb., 1906
207 C	22	10	Mar. 9, 1905	251	71	4	Mar., 1906
208	15	15	Mar. 9, 1905	252	71	4	Mar., 1906
219	32	6	Mar. 14, 1905	253	71	4	Mar., 1906
220	32	6	Mar. 14, 1905	254	72	4	Mar., 1906
222	32	6	Mar. 15, 1905	255	72	4	Mar., 1906
225	20	12	Mar. 14, 1905	256	72	4	Mar., 1906
226	32	6	Mar. 14, 1905	257	72	4	Mar., 1906
227 A	32	6	Mar. 14, 1905	258	72	4	Mar., 1906
227 B	32	5	Mar. 11, 1907	259	73	3	Mar., 1906
227 C	32	6	Mar. 11, 1907	260	73	3	Mar., 1906
228	60	16	*	261	74	4	Apr., 1906
229 A	60	20	*	262	64, 74	4	Apr., 1906
229 B	60	42	*	263	74	1/2	Jan. 7, 1905
230 A	61	1/7	1907	264	66, 74	8	Apr., 1906
230 B	57	2	Jan. 1, 1907	265	66, 74	4	Apr., 1906
230 C	61	2	Dec. 30, 1906	266 B	77	12	Dec. 21, 1906
230 D	61	5	Dec. 30, 1906	267 A	77	4	Dec. 21, 1906
231	60	3	Mar. 14, 1905	267 B	77	12	Jan. 19, 1907
232	60	1/3	Mar. 14, 1905	268 A	77	3	Jan. 19, 1907
233	68	3	Jan., 1906	268 B	77	12	Jan. 19, 1907
234	68, 72	3	Jan., 1906	269 A	77	4	Jan. 19, 1907
235	68	3	Jan., 1906	269 B	77	12	Jan. 19, 1907
236	68	3	Jan., 1906	270	77	12	Dec. 15, 1906
237	68	4	Feb., 1906	271	77	12	Dec. 15, 1906

* Furnished by Prof. Benjamin W. Snow, of Madison, Wis.

The magnifications given in Table 4 and on the original photographs are, in a few cases, larger than belong to the corresponding half-tones, because of the slight reduction necessary to secure uniform size of plates.—EDITOR.

LIST OF TYPES OF CRYSTALS AND NUMBERS OF PHOTOGRAPHS AS REFERRED TO IN THE SECTIONS OF THE PRECEDING TEXT.

Tabular hoarfrost.

Section 11. Type HTA. Superimposed solid hexagons.
Photograph No. 0, 1, 2, 6, 9, 12, 26, 38A, 38B, 38C, 38D, 46, 118, 155, 191.

Section 12. Type HTB. Single solid hexagons.
Photograph No. 7, 20, 33, 34, 61, 199.

Section 13. Type HTC. Solid triangular crystals.
Photograph No. 8, 47A, 47B.

Section 14. Type HTD. Open branch or tree-like structure.
Photograph No. 11, 15, 16, 24, 158, 159, 160, 190.

Section 15. Type HTE. Semiopen branch or tree structure.
Photograph No. 13, 14, 110, 111, 168, 169, 170, 172, 173, 174, 208.

Section 16. Type HTF. Stelliform crystals.
Photograph No. 27A, 154A, 154B, 161.

Section 17. Type HTG. Frost upon and around snow crystals.
Photograph No. 96, 97, 98, 99.

Columnar hoarfrost.

Section 18. Type HCA. Hollow hexagonal columns, tapering.
Photograph No. 36A, 36B, 36C, 36D, 36E.

Section 19. Type HCB. Solid hexagonal columns, long needles.
Photograph No. 27B, 27C, 35A, 36A.

Section 20. Type HCC. Hexagonal funnel crystals, cup-shaped.
Photograph No. 37, 116, 225.

Section 21. Type HCD. Longitudinal segments.
No photographs.

Section 22. Type HCE. Compound crystals.
Photograph No. 162, 163, 201, 206, 207A, 207C.

Section 23. Type HCF. Frost around snow granules.
Photograph No. 207B.

Window frost.

Section 31. Type WLA. Linear crystals.
Photograph No. 25, 29, 44, 45, 48, 100, 107, 108, 126, 185, 186, 187, 192, 193.

Section 32. Type WBB. Branching window frost.
Photograph No. 3, 4, 5, 10, 21, 22, 23, 40, 42, 43, 48, 54, 55, 56, 60, 64, 65, 66B, 67, 69, 70, 77, 85, 95, 102, 103, 104, 105, 106, 109, 112, 119A, 119B, 122, 123, 124, 125, 128, 143, 144, 145A, 145B, 166, 167, 194, 202, 203, 204, 205, 219, 220, 222, 226, 227A, 227B, 227C.

Section 33. Type WFC. Filamentous window frost.
Photograph No. 30, 31, 42, 69, 73, 115, 117, 130, 131, 132, 146, 147, 148, 177, 179, 195, 196A, 196B.
Section 34. Type WMD. Meandering window frost.
Photograph No. 58A, 58B, 59, 154A, 154B, 175, 176, 178, 188.
Section 35. Type WSE. Stelliform crystals.
Photograph No. 145A, 154B, 161.
Section 36. Type WLF. Solid lamellar crystals.
Photograph No. 32, 53, 58A, 58B, 59, 117, 129, 171, 180A, 180B.
Section 37. Type WCG. Columnar forms.
Photograph No. 156, 157.
Section 38. Type WOH. Open-structure forms.
Photograph No. 86, 120, 121, 127, 132.
Section 39. Type WTI. Tooth-shaped crystals.
Photograph No. 32, 58B, 59.
Section 40. Type WFJ. Fibroid crystals.
Photograph No. 28A, 28B.
Section 44. Type WGK. Granular dew-like frost.
Photograph No. 17, 48, 80, 81, 100, 103, 106, 107, 108, 122, 125, 128, 144, 148.

Window ice.

Section 50. Type IFA. Feather-form crystals.
Photograph No. 49, 50, 51, 52, 62, 63, 66A, 68A, 68B, 72, 74, 75, 78, 79, 82, 83, 88, 89, 91, 92, 93, 101, 113, 133, 134, 135, 136, 138, 139, 140, 142, 150, 151, 152, 164, 182, 183, 189.
Section 51. Stages of growth in type IFA.
First stage. Photograph No. 49, 62.
Second stage. Photograph No. 133, 135, 136, 138, 139.
Third stage. Photograph No. 66A, 68A, 68B, 72, 88, 134, 140, 142.
Section 52. Special cases of type IFA.
Photograph No. 62, 74, 79, 88, 93, 136, 138, 139, 140, 142, 189.
Section 53. Other special cases of type IFA.
Photograph No. 101, 136, 140, 150, 164, 182, 183.
Section 54. Type IAB. Arborescent crystals.
Photograph No. 84, 87, 92, 94, 149, 153, 164, 165.

Ordinary massive ice.

Section 57. Structure of old ice.
Photograph No. 230B.
Section 60. Ice crystals embedded in solid ice.
Photograph No. 228, 229A, 229B, 231, 232.
Section 61. Structure of pond ice.
Photograph No. 230A, 230C, 230D.
Section 64. Diversity of types.
Photograph No. 262.
Section 66. Effect of contiguity on growth.
Photograph No. 264, 265.
Section 68. Type MLA. Lanceolate crystals.
Photograph No. 233, 234, 235, 236, 237, 238, 239A, 239B, 240.
Section 69. Type MDB. Discoidal crystals.
Photograph No. 241, 242, 243, 244, 245, 246, 247, 248, 249.
Section 70. Type MHC. Solid hexagonal crystals.
Photograph No. 241, 250.
Section 71. Type MFD. Flower-like crystals.
Photograph No. 250, 251, 252, 253.
Section 72. Type MSE. Spandrelliform crystals.
Photograph No. 254, 255, 256, 257, 258.
Section 73. Type MCF. Coralline crystals.
Photograph No. 259, 260.
Section 74. Miscellaneous additional ice crystals.
Photograph No. 261, 262, 263, 264, 265.

Hail.

Section 77. Winter hailstones.
Photograph No. 266B, 267A, 267B, 268A, 268B, 269A, 269B, 270, 271.

THE END.

THE WEATHER OF THE MONTH.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure for December, 1907, over the United States and Canada, is graphically shown on Chart VI, and the average values and departures from the normal are shown for each station in Tables I and V.

A comparison of the chart of monthly mean pressure for December, 1907, with that of the preceding month shows a reduction in the mean sea-level pressure over all portions of the United States and Canada, except small areas near the south Atlantic and south Pacific coasts, where slight increases occurred.

The decrease in pressure was most pronounced over the Canadian Maritime Provinces and the north Pacific coast, where it ranged from 0.20 to 0.25 inch. This is the reverse of normal conditions, which show a uniform increase in average pressure from November to December over all portions of the United States, except over the north Pacific coast and northern New England, where the pressure is normally slightly less than in November.

The average sea-level pressure during December, 1907, was from .05 to .15 inch below the normal over practically all portions of the United States and Canada, the only exceptions being the southern parts of California, Arizona, New Mexico, and western Texas, where it was slightly above the normal.

Comparatively high mean pressure, about 30.15 inches, prevailed over the central portions of the Rocky Mountain, Plateau, and Pacific coast districts, and another moderately high area, about 30.10 inches, was maintained over the South Atlantic and east Gulf States.

Pressure averaged unusually low along the entire northern border, decreasing rapidly from about 30.15 inches over northern Wyoming to about 29.85 inches over the Canadian Northwest Provinces and to slightly less over the more eastern Canadian districts.

With the ridge of highest pressure extending from the south Atlantic coast northwesterly to the central Rocky Mountain district and southwesterly to the Pacific coast, the surface winds over all northern districts from the Atlantic to the Pacific and extending into Canada, were largely from southerly points.

Over the east Gulf States, portions of Texas and the southern Rocky Mountain, Plateau, and Pacific coast districts northerly winds were the rule.

From the Mississippi Valley eastward there was a general increase in the surface wind movement, and also over the north Pacific coast district, where the month was an unusually stormy one.

Over the Great Plains and Rocky Mountain and Plateau districts storms were infrequent and the wind movement was correspondingly less than the average.

TEMPERATURE.

It is probable that during no December since 1877 has there been such a universal excess of temperature over the territory from the Mexican boundary northward to the Arctic Circle as is shown by the records for the current month. Only on rare occasions are such large portions of the United States and Canada dominated by similar temperature conditions.

The Rocky Mountain system appears to be a dividing line, on either side of which temperature conditions are generally at variance. If there is an excess or deficiency over the districts to the east, there is generally a compensating deficiency or excess in the districts to the west. During the current month the temperature was in excess of the normal over practically all districts in the United States, and, except at a few points in British Columbia, the whole of Canada appears to have experienced similar conditions.

Over nearly all the more northern districts of the United States the average temperature for the month exceeded the normal from 4° to 8°. The excess of temperature was well distributed thru the various decades of the month, the cold periods being confined to the second decade of the month and generally of short duration. A slight deficiency in mean temperature, less than 1° per day, prevailed over eastern Alabama, western and northern Georgia, and western South Carolina.

Maximum temperatures were not unusually high or minimum temperatures unusually low over any districts. Maximum temperatures slightly above 80° were recorded over the southern portions of Florida, Texas, and California, while over the upper Lake region, the upper Mississippi Valley, and in the mountain

districts of Idaho, Montana, Wyoming, and Colorado they did not go above 50°.

Temperatures of 32° or lower extended to the coast line of the east Gulf States and into northern Florida and over California, except near the coast and at the lower elevations of the southern part of the State. Temperatures from 0° to −30° were recorded in the mountain districts of the west and from −10° to −20° in the northern portions of New York and New England.

PRECIPITATION.

The distribution of precipitation during December, 1907, is graphically shown on Chart IV by appropriate shading or by figures representing the actual amount of fall.

The heaviest precipitation for the month occurred on the western slopes of the Sierra Nevada, Cascade, and Coast ranges of mountains in northern California, Oregon, and Washington, where the depths of fall ranged from 10 to 35 inches. At Roseburg, Oreg., the amount for the month, 12.82 inches, was the greatest fall ever reported from that station.

Amounts from 8 to slightly more than 10 inches occurred over the southern portion of the east Gulf States, and amounts from 4 to 6 inches were general over the remaining portions of that district, and also over the Atlantic coast States and portions of the Lake region and locally in the Ohio Valley.

Over the upper Mississippi and Missouri valleys, the Great Plains, and the lower elevations of the Rocky Mountain and Plateau districts the amounts of precipitation were generally less than 1 inch.

The amounts of precipitation over portions of the mountain districts from northern California to Washington ranged from 5 to 15 inches above the normal, while over western Florida and the southern portions of Alabama and Georgia they ranged from 4 to 6 inches above. Over the remaining portions of the east Gulf States, the Atlantic coast, and lower Lake region the normal was exceeded by amounts generally less than 2 inches, and there was a small excess over the central portions of the Great Plains, Rocky Mountains, and Plateau districts.

Precipitation was deficient by small amounts over most of the Ohio Valley, the Mississippi and Missouri valleys, and the northern and southern portions of the mountain and Plateau districts. Deficiencies of about 2 inches occurred locally over southern California and of more than 4 inches over extreme northwestern Washington.

SNOWFALL.

The area over which snow occurred during December was but slightly greater than during the preceding month, altho the depth of fall averaged much greater.

Amounts from 5 to 20 inches occurred in the Appalachian Mountains from Virginia northward, over New England, and in the Lake region, and greater depths locally in the mountain and Plateau districts of the west. Depths from 50 to 70 inches occurred over the high elevations of the Sierra Nevada Mountains in northern California, and considerable depths were reported from the mountain districts of Washington, Oregon, and Idaho. Over the upper Missouri Valley and northern slope districts the total fall for the month was generally less than 5 inches.

But little snow remained on the ground at the end of the month, except in the more northern districts and over the mountain ranges of the west. In central and northern Maine depths from 6 to 8 inches were reported, and similar depths prevailed over portions of Michigan, Wisconsin, southern Minnesota, and northern Iowa.

Over the high elevations of the Rocky Mountains from central Colorado northward and the high Sierra of central and northern California considerable snow had accumulated, depths of more than 5 feet being reported from points in the last-named mountains.

HUMIDITY AND SUNSHINE.

The average relative humidity was slightly below normal over the cotton belt and South Atlantic coast States, and locally over the upper Lake region and portions of Oregon, Washington, and Idaho. Over most of the interior districts it was above normal, and to a marked extent over the central and southern slope, Mountain, and Plateau districts, where similar conditions have been maintained thruout the year.

There was a pronounced absence of sunshine in the Ohio, Mississippi, and Missouri valleys, and over the Plateau and Pacific coast districts. In the latter region the percentage of clear sky ranged from 40 to less than 10 per cent of the possible amount.

Along the Atlantic coast, over Texas, New Mexico, Arizona, and the northern slope there was a slight excess over the usual amount of sunshine.

WEATHER IN ALASKA.

Scattered reports from points nearly as far north as the Arctic Circle indicate that December, 1907, was a rather mild month over the Territory. Over the southern coast districts the minimum temperatures scarcely reached the zero point.

In the southern and eastern interior portions, including the Copper River and upper Yukon districts, cold weather prevailed about the 10th, and again during the latter portion of the month, but no extremely low temperatures were reported, the lowest recorded at Circle City being −38°, at Fairbanks −36°, at Copper Center −42°, and at Dawson −30°.

Moderate temperature prevailed during the first and third weeks of the month, with the minimum temperature frequently above zero.

Considerable snow accumulated in the interior districts, the depths ranging from a few inches to about 3 feet. Near the coast the precipitation was mostly in the form of rain.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	12	33.4	+ 3.7	−19.3	− 1.6
Middle Atlantic	16	37.7	+ 2.1	−13.7	− 1.1
South Atlantic	10	47.8	+ 0.6	+ 5.4	+ 0.4
Florida Peninsula*	8	61.3	+ 0.2	+12.8	+ 1.1
East Gulf	11	49.0	− 0.1	+14.5	+ 1.2
West Gulf	10	50.5	+ 1.8	+20.1	+ 1.7
Ohio Valley and Tennessee	13	38.3	+ 1.2	− 5.3	− 0.4
Lower Lake	10	31.7	+ 2.4	−20.1	− 1.7
Upper Lake	12	26.1	+ 1.9	−12.7	− 1.1
North Dakota*	9	21.3	+ 9.1	−10.6	− 0.9
Upper Mississippi Valley	15	31.6	+ 4.3	− 4.7	− 0.4
Missouri Valley	12	32.4	+ 5.5	+ 5.7	+ 0.5
Northern Slope	9	25.8	+ 2.4	− 1.7	− 0.1
Middle Slope	6	35.6	+ 2.7	+14.8	+ 1.2
Southern Slope*	7	44.4	+ 2.0	+19.2	+ 1.6
Southern Plateau*	12	42.1	+ 2.2	+ 2.9	+ 0.2
Middle Plateau*	10	32.0	+ 3.9	+14.1	+ 1.2
Northern Plateau*	12	32.5	+ 1.9	+ 2.1	+ 0.2
North Pacific	7	43.5	+ 1.9	+ 2.8	+ 0.2
Middle Pacific	8	49.4	+ 1.1	+ 0.1	0.0
South Pacific	4	54.9	+ 2.3	+ 9.5	+ 0.8

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Director R. F. Stupart says:

In British Columbia, over the northwestern and northern portions of the province, the temperature was average or slightly below; elsewhere thruout the Dominion it was above the average and nearly everywhere to a marked extent. In the Western Provinces the positive departure ranged from 5° to 9°; in Ontario from 2° to 7°; in Quebec from 5° to 8°, and in the Maritime Provinces from 3° to 8°.

In British Columbia, Cariboo reported an excess of precipitation equivalent to nearly 90 per cent, but elsewhere in the province there was a general deficiency, amounting at Victoria to 52 per cent. In the Western Provinces, in the southern portion of Saskatchewan, there was a positive departure of 200 per cent at Regina and 79 per cent at Swift Current, otherwise the negative departure was everywhere marked; Winnipeg and Medicine Hat recorded deficiencies of 98 and 63 per cent, re-

spectively. In Ontario the distribution of precipitation was very variable, some localities experiencing an amount much in excess of the average and others again much less than the average. The most noticeable extremes were positive departures of 98 per cent at Toronto and 46 per cent at Ottawa, and negative departures of 49 per cent at White River and 94 per cent at Port Arthur. In Quebec the average amount was exceeded in all localities, more so in the western than in the eastern portion; Montreal recorded 60 per cent above the usual quantity. In the Maritime Provinces, in the region of the Bay of Fundy and very locally elsewhere, the precipitation was less than the average, but over the large remaining portion of the provinces the average was exceeded. The noticeable departures were a deficiency of 39 per cent at St. John and 79 per cent at Chatham, and an excess of 25 per cent at Halifax and Charlottetown.

At the close of the year there was a remarkable absence in the Dominion of any pronounced depth of snow on the ground, and in many localities there was none. Considering the provinces individually the conditions were: In British Columbia none on the lowlands and apparently little on the mountains; Alberta none; Saskatchewan and Manitoba 1 inch to 6 inches; Ontario from a trace to 15 inches (Ottawa recorded the 15 inches, whereas White River, north of Lake Superior, gave only 4 inches); Quebec from 5 to 11 inches; the Maritime Provinces 1 inch to 3 inches in northern and none in southern localities.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	12	4.38	130	+1.0	— 0.9
Middle Atlantic	16	4.09	128	+0.9	— 0.8
South Atlantic	10	4.52	128	+1.0	—10.0
Florida Peninsula*	8	4.87	182	+2.2	— 7.3
East Gulf	11	6.54	144	+2.0	+ 0.5
West Gulf	10	2.46	86	—0.4	— 5.6
Ohio Valley and Tennessee	13	2.99	86	—0.5	— 2.7
Lower Lake	10	3.82	131	+0.9	— 0.8
Upper Lake	12	1.87	86	—0.3	— 2.9
North Dakota*	9	0.29	49	—0.3	— 2.2
Upper Mississippi Valley	15	1.33	73	—0.5	+ 0.9
Missouri Valley	12	0.91	90	—0.1	— 3.0
Northern Slope	9	0.65	68	—0.3	+ 0.1
Middle Slope	6	0.98	126	+0.2	— 1.5
Southern Slope*	7	1.21	109	+0.1	— 0.4
Southern Plateau*	12	0.25	26	—0.7	+ 2.7
Middle Plateau*	10	1.23	119	+0.2	+ 1.8
Northern Plateau*	12	2.04	117	+0.3	+ 1.3
North Pacific	7	9.00	114	+1.1	—10.0
Middle Pacific	8	4.80	104	+0.2	+ 0.5
South Pacific	4	1.40	64	—0.8	+ 0.5

* Regular Weather Bureau and selected cooperative stations.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	6.2	+ 0.4	Missouri Valley	5.8	+ 0.7
Middle Atlantic	6.1	+ 0.7	Northern Slope	5.4	+ 0.8
South Atlantic	5.1	+ 0.4	Middle Slope	5.2	+ 1.2
Florida Peninsula	4.6	0.0	Southern Slope	4.0	— 0.4
East Gulf	6.0	+ 0.8	Southern Plateau	2.9	— 0.5
West Gulf	4.6	— 0.7	Middle Plateau	5.9	+ 0.8
Ohio Valley and Tennessee	7.2	+ 1.1	Northern Plateau	7.4	+ 0.6
Lower Lake	8.0	+ 0.4	North Pacific	8.3	+ 1.1
Upper Lake	7.4	+ 0.3	Middle Pacific	7.5	+ 2.1
North Dakota	5.3	+ 0.1	South Pacific	4.8	+ 0.1
Upper Mississippi Valley	6.5	+ 0.8			

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	77	+ 1	Missouri Valley	75	0
Middle Atlantic	77	+ 2	Northern Slope	75	+ 7
South Atlantic	79	+ 1	Middle Slope	68	+ 2
Florida Peninsula	81	0	Southern Slope	68	0
East Gulf	77	0	Southern Plateau	52	+ 4
West Gulf	73	— 1	Middle Plateau	70	+ 6
Ohio Valley and Tennessee	77	+ 1	Northern Plateau	78	— 1
Lower Lake	80	+ 2	North Pacific	85	— 1
Upper Lake	83	+ 1	Middle Pacific	83	+ 2
North Dakota	82	+ 3	South Pacific	72	+ 3
Upper Mississippi Valley	80	+ 2			

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Block Island, R. I.	14	70	e.	North Head, Wash.	25	84	s.
Do	31	66	nw.	Do	31	62	s.
Buffalo, N. Y.	23	50	sw.	Pittsburg, Pa	30	54	w.
Do	31	62	w.	Point Reyes Light, Cal.	4	52	s.
Cape Henry, Va	4	56	nw.	Do	6	72	s.
Do	5	59	nw.	Do	10	66	s.
Do	14	51	e.	Do	12	58	s.
Charleston, S. C.	13	50	se.	Do	15	52	se.
Cheyenne, Wyo.	24	56	w.	Do	19	82	nw.
Hatteras, N. C.	5	52	n.	Do	29	72	s.
Huron, S. Dak	24	51	nw.	Do	30	70	s.
Mount Tamalpais, Cal.	4	62	sw.	Pueblo, Colo.	26	52	nw.
Do	10	78	sw.	Richmond, Va.	23	53	s.
Do	12	58	sw.	Seattle, Wash.	4	56	sw.
Do	19	50	w.	Do.	13	58	s.
Do	26	50	sw.	Sioux City, Iowa.	24	58	nw.
Do	30	50	sw.	Southeast Farallon, Cal.	6	53	s.
Mount Weather, Va.	10	57	nw.	Do	10	50	s.
Do	11	52	nw.	Do	29	61	s.
Do	19	54	nw.	Do	30	52	s.
Do	30	70	nw.	Syracuse, N. Y.	30	60	s.
Nantucket, Mass.	10	54	s.	Tatoosh Island, Wash.	2	52	s.
Do	14	55	e.	Do	4	58	s.
New York, N. Y.	14	56	ne.	Do	8	64	e.
Do	31	54	w.	Do	11	54	sw.
North Head, Wash.	2	52	s.	Do	12	50	ne.
Do	3	60	se.	Do	13	52	w.
Do	4	69	se.	Do	19	56	e.
Do	11	78	s.	Do	20	66	s.
Do	12	96	se.	Do	23	82	sw.
Do	13	50	w.	Do	25	56	w.
Do	20	70	se.	Do	29	60	e.
Do	21	61	s.	Do	30	66	e.
Do	23	70	s.	Do	31	52	e.

CLIMATOLOGICAL SUMMARY.

By Mr. JAMES BERRY, Chief of the Climatological Division.

TEMPERATURE AND PRECIPITATION BY SECTIONS, DECEMBER, 1907.

In the following table are given, for the various sections of the Climatological Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	46.3	+ 0.4	Lucy Spring Hill	77 77	30 30	Valley Head	12	5	6.01	+ 1.52	Eufaula	11.12	Valley Head	2.03
Arizona	48.0	+ 1.4	Casagrande	91	6	St. Michaels	1	17	0.09	— 0.96	Greer	1.20	31 stations	0.00
Arkansas	44.4	+ 2.2	Lewisville	85	28, 29	Bergman Dutton	11 11	4, 19 11	2.70	— 1.31	Eldorado	4.62	Bee Branch	1.35
California	48.3	+ 1.7	3 stations	88	3 dates	Tamarack	—16	29	5.41	+ 1.03	Monumental	35.89	6 stations	0.00
Colorado	26.4	+ 0.8	Blaine	70	6	Breckenridge	—32	18	0.89	+ 0.07	Corona	3.76	Canon City	0.00
Florida	58.6	— 0.7	5 stations	86	28–30	Wausau	21	5	5.97	+ 3.03	Monticello	15.64	Miami	1.19
Georgia	46.8	+ 0.6	Hawkinsville	79	30	Lisbon	14	5	6.46	+ 2.11	Clayton	10.21	Elberton	3.18
Hawaii	70.5†	......	Honokaa, Hawaii	89	22	Humuula, Hawaii	36	3	3.99‡	......	Wahiawa Mt., Kauai	14.25	3 stations	0.00
Idaho	29.2	+ 1.4	Garnet	78	6	Chesterfield	—33	19	2.50	+ 0.30	Landore	7.04	Salmon	0.44
Illinois	33.9	+ 3.5	Chester	74	28	Lanark	2	2	2.52	+ 0.18	Martinton	5.68	Rockford	0.17
Indiana	33.9	+ 2.1	Auburn Marengo	66 66	8 28	Auburn	4	5	4.09	+ 1.25	Marengo	5.55	Salamonia	1.38
Iowa	28.8	+ 5.9	Mount Pleasant	62	9	Osage	— 9	28	1.00	— 0.24	Plover	2.28	Hancock	0.05
Kansas	34.7	+ 2.5	Ashland Hugoton	75 75	1 5	Harrison Republic	—12 —12	19 17	1.47	+ 0.61	Anthony	3.42	Atchison	0.24
Kentucky	38.5	+ 1.9	Loretto Williamsburg	70 70	30 28	Farmers	8	5	3.20	— 0.70	Lynnville	4.48	Williamsburg	1.30
Louisiana	52.4	+ 1.1	Ruston Tallulah	87 87	28 28	Robeline	19	5, 26	4.75	+ 0.25	Pearl River	10.06	Robeline	1.34
Maryland and Delaware	37.4	+ 2.4	College Park, Md.	76	29	Oakland, Md	— 7	22	4.18	+ 0.92	Darlington, Md	5.86	Solomons, Md	2.04
Michigan	27.0	+ 1.8	3 stations	60	7–9	Humboldt	—18	3 dates	2.82	+ 0.88	Battle Creek	5.12	Humboldt	0.40
Minnesota	21.3	+ 5.7	Windom Worthington	56 56	6 6	Halstad	—34	25	0.56	— 0.19	Stillwater	1.91	2 stations	0.10
Mississippi	47.9	+ 0.2	Greenville	82	28	Austin Duck Hill	17 17	5 5	4.64	+ 0.03	Bay Saint Louis	10.80	Austin	1.76
Missouri	37.7	+ 3.9	Willowsprings	76	27	Oregon	3	19	1.84	— 0.62	De Soto Wheatland	4.52 4.52	Conception	0.14
Montana	27.0	+ 2.7	Lewistown	71	4	Grayling	—40	19	0.53	— 0.44	Saltese	4.75	Fort Benton	0.00
Nebraska	29.3	+ 1.6	Hayes Center	74	5	Scottsbluff	—21	19	0.68	+ 0.05	Du Boise	2.14	Benkelman	0.10
Nevada	35.6	+ 4.6	Jean	78	3, 5	Potts	—11	29	1.47	+ 0.37	Lewers Ranch	6.83	3 stations	0.00
New England*	30.7	+ 3.7	Danielson, Conn.	75	28	Enosburg Falls, Vt.	—14	4	4.29	+ 1.17	Kingston, R. I.	7.99	Manchester, Vt.	1.80
New Jersey	36.6	+ 3.1	Toms River	70	28	Layton	3	20	4.91	+ 1.10	Atlantic City	7.13	Sussex	3.55
New Mexico	37.4	+ 1.7	Deming	78	25	Dulce	—16	18	0.26	— 0.43	Chama	2.40	20 stations	0.00
New York	29.9	+ 3.6	Allegany	63	9	Indian Lake	—20	5	3.98	+ 0.82	Adams Center	7.31	Plattsburg	1.10
North Carolina	42.8	+ 1.3	Goldsboro Kinston	79 79	13 30	Brevard	6	5	5.37	+ 1.67	Horse Cove	10.78	Hot Springs	2.13
North Dakota	20.1	+ 7.2	Oakdale	68	5	Lakota	—26	27	0.30	— 0.13	Crosby Hillsboro	1.28 1.28	7 stations	T.
Ohio	33.0	+ 2.2	Ottawa	69	27	Hedges Norwalk	2 2	5 5	3.16	+ 0.40	Hedges	5.55	Pomeroy	1.10
Oklahoma	42.3	+ 3.3	Wagoner	79	8	Kenton	4	18	2.38	+ 1.21	South McAlester	4.80	Kenton	0.60
Oregon	39.6	+ 2.1	Bay City	77	2	Wallowa	0	18	9.39	+ 3.27	Glenora	28.71	Huntington	0.54
Pennsylvania	33.2	+ 2.5	Irwin	68	9	Saegerstown	— 8	4	4.30	+ 1.13	Girardville	7.89	Renovo	1.85
Porto Rico	74.9	......	Mayaguez	94	3	Rio Blanco	55	29	7.05	......	Canovanas	12.93	Santa Isabel	1.43
South Carolina	46.2	0.0	3 stations	75	3 dates	Liberty	12	5	5.81	+ 2.14	Yorkville	8.70	Smiths Mills	3.11
South Dakota	26.4	+ 5.7	Hermosa	73	4	Clifton	—15	30	0.55	+ 0.01	Centerville	1.28	Mound City	T.
Tennessee	41.4	+ 1.6	Savannah	78	29	Erasmus	5	5	3.81	— 0.86	Tullahoma	7.32	Jonesboro	1.85
Texas	50.3	+ 1.4	Falfurrias Sabinal	85 85	28 28	Plemons Texline	5 5	18, 20 18	2.00	+ 0.05	Lufkin	6.37	3 stations	0.00
Utah	30.6	+ 3.8	Experiment Farm	68	8	Woodruff	—22	30	1.58	+ 0.72	Park City	3.90	Tropic	0.08
Virginia	39.0	+ 1.5	Charlottesville Doswell	72 72	8 28	Burkes Garden	7	20	3.77	+ 0.63	Lexington	6.59	Radford	2.02
Washington	37.1	+ 1.5	East Sound	70	2	Twisp	— 9	18	5.76	+ 0.54	Quiniault	22.13	Wahluke	0.83
West Virginia	35.5	+ 1.0	Fairmont	70	9	Bayard	— 2	22	3.36	— 0.19	Terra Alta	9.31	New Cumberland	0.70
Wisconsin	24.1	+ 4.1	Beloit	54	27	Hayward	—21	28	1.19	— 0.14	Waupaca	2.63	Crandon	0.07
Wyoming	23.4	+ 0.1	Eatons Ranch	73	4	Fayette Snake River, Y. N. P.	—38 —38	19 19	0.93	+ 0.11	Lake Yellowstone, Y. N. P.	4.07	Basin	0.00

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. † 50 stations, with an average elevation of 635 feet. ‡ 145 stations.

DESCRIPTION OF TABLES AND CHARTS.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

For description of tables and charts see page 30 of REVIEW for January, 1907.

TABLE I.—*Climatological data for U. S. Weather Bureau stations, December, 1907.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.							**33.4**	**+ 3.7**										**77**	**4.38**	**+ 1.0**										**6.2**	
Eastport	76	69	85	29.81	29.90	− .08	30.8	+ 5.5	52	10	37	11	14	25	25	29	24	77	4.94	+ 1.0	9	10,239	w.	46	e.	15	1	8	22	8.1	14.7
Portland, Me.	103	81	117	29.82	29.95	− .08	31.6	+ 4.5	54	10	38	15	3	26	20	28	23	73	4.12	+ 0.4	10	7,015	sw.	40	s.	10	9	10	12	5.2	8.1
Concord	288	70	79	29.63	29.95	− .11	30.8	+ 4.4	63	10	38	6	22	23	40	...	...	...	2.62	− 0.7	7	8,995	nw.	32	w.	31	20	4	7	4.0	7.7
Burlington	404	12	47	29.51	29.97	− .08	27.0	+ 1.5	52	10	34	− 1	4	20	20	...	...	...	2.61	+ 0.9	16	8,834	s.	48	s.	27	3	6	22	8.3	7.4
Northfield	876	16	70	28.98	29.96	− .09	25.0	+ 4.5	51	28	35	− 9	5	16	41	33	20	84	3.97	+ 1.3	16	4,479	s.	34	nw.	31	3	9	19	7.8	11.5
Boston	125	115	188	29.82	29.96	− .09	37.2	+ 5.6	64	10	44	20	5	30	24	33	28	72	4.31	+ 0.9	11	8,999	w.	43	e.	14	7	15	9	6.0	7.0
Nantucket	12	14	90	29.95	29.96	− .09	38.5	+ 1.8	58	23	44	26	5	33	19	36	33	83	5.49	+ 1.8	10	13,784	w.	55	e.	14	11	10	10	5.8	6.1
Block Island	26	11	46	29.95	29.98	− .08	38.2	+ 1.6	57	23	43	21	5	34	17	35	31	78	5.68	+ 1.9	10	15,547	w.	70	e.	14	11	10	10	5.3	4.6
Narragansett	...	9	...	...	...	...	35.4	+ 2.9	57	23	43	15	6	28	28	...	...	...	5.69	...	9	...	w.	...	...	...	15	5	11	...	8.0
Providence	160	57	67	29.81	29.99	− .07	35.4	+ 3.8	58	28	42	19	5	28	23	32	27	75	4.96	+ 1.6	9	5,890	w.	30	w.	31	9	11	11	5.7	10.9
Hartford	159	122	132	29.81	29.99	− .08	34.5	+ 4.7	57	10	41	18	5	28	28	31	26	74	4.70	+ 1.1	9	5,343	sw.	43	s.	10	3	14	14	7.2	13.1
New Haven	106	116	155	29.88	30.00	− .07	35.8	+ 4.0	56	23	42	19	5	29	24	32	28	77	4.73	+ 1.1	8	7,068	w.	46	s.	10	12	11	8	4.7	8.4
Mid. Atlantic States.							**37.7**	**+ 2.1**										**77**	**4.09**	**+ 0.9**										**6.1**	
Albany	97	102	115	29.89	30.00	− .07	32.4	+ 4.9	55	10	38	10	5	26	24	29	26	80	2.52	0.0	9	5,155	s.	30	s.	27	5	8	18	7.3	10.6
Binghamton	871	78	90	29.04	29.99	− .10	30.0	+ 2.3	53	10	37	7	22	23	32	...	...	...	3.15	+ 0.7	14	4,603	w.	27	s.	30	4	5	22	7.8	11.2
New York	314	108	350	29.66	30.01	− .08	37.8	+ 3.4	58	23	43	19	5	33	18	34	30	74	3.91	+ 0.5	10	10,419	w.	56	ne.	14	7	13	11	5.9	4.4
Harrisburg	374	94	104	29.64	30.06	− .06	34.2	+ 1.4	57	10	40	17	5	28	24	31	27	77	4.43	+ 1.8	10	5,397	w.	36	nw.	31	3	13	15	6.9	10.3
Philadelphia	117	116	184	29.91	30.04	− .07	39.3	+ 3.6	62	23	45	21	5	33	24	36	33	79	4.67	+ 1.6	10	7,852	nw.	40	ne.	14	7	11	13	6.3	5.6
Scranton	805	111	119	29.12	30.01	− .09	33.0	+ 3.2	56	10	39	14	4	27	27	30	26	78	4.63	+ 2.0	17	5,463	sw.	34	se.	14	3	7	21	8.0	20.1
Atlantic City	52	37	48	29.99	30.05	− .05	38.8	+ 2.4	55	10	44	21	5	33	17	35	31	77	7.13	+ 3.4	9	6,720	nw.	34	s.	10	9	11	11	5.9	T.
Cape May	17	48	52	30.05	30.07	− .04	39.9	+ 1.9	56	28	44	23	5	36	16	37	...	...	4.63	+ 0.8	9	7,456	nw.	40	e.	14	7	14	10	5.6	T.
Baltimore	123	69	117	29.90	30.04	− .09	39.0	+ 2.1	66	28	45	20	5	33	26	35	30	75	4.30	+ 1.2	10	5,431	w.	46	w.	30	9	10	12	5.6	2.1
Washington	112	59	76	29.93	30.06	− .07	38.1	+ 2.0	68	28	46	19	13	30	32	33	28	70	4.20	+ 1.0	7	5,653	nw.	38	w.	30	12	8	11	5.5	1.9
Cape Henry	18	11	58	30.05	30.07	− .05	44.0	+ 0.3	69	28	51	27	6	37	24	...	...	...	3.00	− 0.4	9	10,009	sw.	59	nw.	5	15	5	11	4.4	T.
Lynchburg	681	83	88	29.32	30.09	− .05	40.0	+ 1.3	66	28	49	20	20	31	35	35	30	74	4.45	+ 1.2	8	2,857	sw.	26	nw.	31	8	14	9	5.3	T.
Mount Weather	1,725	10	57	28.14	30.03	− .10	33.4	+ 1.9	61	28	39	13	5	28	25	30	25	75	4.74	+ 1.6	10	...	nw.	70	nw.	30	9	9	13	6.1	5.9
Norfolk	91	102	111	29.98	30.08	− .05	45.1	+ 2.1	69	23	53	25	5	38	26	40	36	76	3.27	− 0.2	9	6,986	se.	48	w.	30	13	6	12	5.2	1.5
Richmond	144	145	153	29.91	30.07	− .07	42.0	+ 1.0	68	28	50	24	13	34	31	...	...	...	3.44	+ 0.4	8	6,463	s.	53	s.	23	11	10	10	5.1	T
Wytheville	2,293	40	47	27.63	30.09	− .06	35.6	+ 0.3	65	8	43	15	20	28	38	32	29	85	3.01	− 0.7	11	4,763	w.	38	w.	30	8	7	16	6.6	0.1
S. Atlantic States.							**47.8**	**+ 0.6**										**79**	**4.52**	**+ 1.0**										**5.1**	
Asheville	2,255	53	75	27.68	30.12	− .04	39.0	+ 1.2	67	28	48	18	6	30	35	34	31	80	3.74	− 0.3	11	6,844	nw.	37	nw.	30	9	9	13	5.9	0.7
Charlotte	773	68	76	29.24	30.10	− .06	42.6	− 0.3	66	30	51	22	5	35	28	38	33	75	6.99	+ 3.1	13	5,462	s.	38	sw.	23	11	9	11	5.6	1.8
Hatteras	11	12	47	30.07	30.08	− .05	49.2	+ 0.4	70	30	55	32	5	43	21	46	44	87	2.98	− 2.2	8	11,176	nw.	52	n.	5	17	6	8	5.3	T.
Raleigh	376	71	79	29.68	30.10	− .05	44.3	+ 1.6	68	30	53	24	5	35	28	38	33	72	7.78	+ 4.6	11	4,771	sw.	34	nw.	30	14	8	4	4.9	2.6
Wilmington	78	81	91	30.02	30.11	− .04	49.1	+ 1.9	71	30	58	27	5	40	29	43	39	77	2.31	− 0.8	11	6,067	w.	34	sw.	30	13	12	6	4.4	0.4
Charleston	48	14	92	30.06	30.11	− .04	51.6	+ 0.3	70	10	59	30	5	44	29	47	44	81	4.08	+ 0.9	9	7,660	sw.	50	se.	13	9	16	6	4.5	
Columbia, S. C.	351	41	57	29.72	30.11	− .05	46.6	− 0.6	69	30	56	24	5	38	33	41	36	75	4.22	+ 1.3	15	5,388	sw.	35	w.	23	8	10	13	6.0	0.4
Augusta	180	89	97	29.91	30.11	− .05	47.2	+ 0.2	70	30	57	24	5	38	33	42	39	81	4.83	+ 1.4	15	4,579	w.	32	sw.	23	13	7	11	5.0	T.
Savannah	65	81	89	30.05	30.12	− .03	52.3	+ 1.0	74	30	61	29	5	44	26	46	43	78	3.98	+ 0.9	11	5,966	w.	31	sw.	14	9	11	11	5.5	
Jacksonville	43	101	129	30.07	30.12	− .02	55.6	+ 0.4	78	29	64	31	5	47	31	52	49	84	4.39	+ 1.4	9	7,704	n.	42	sw.	14	12	9	10	4.9	
Florida Peninsula.							**66.5**	**+ 1.2**										**81**	**3.02**	**+ 0.9**										**4.6**	
Jupiter	28	10	48	30.06	30.08	− .02	67.3	+ 1.0	80	30	74	43	5	60	26	62	60	82	1.82	− 1.0	9	8,711	se.	38	sw.	14	3	23	5	5.8	
Key West	22	10	53	30.04	30.06	− .02	70.8	+ 0.7	82	9	75	58	16	66	14	66	63	81	1.80	0.0	7	8,136	ne.	33	w.	14	15	13	3	4.2	
Sand Key	25	41	71	30.02	30.05	− .03	71.1	...	79	13	74	60	5	68	10	...	...	...	1.07	− 0.8	5	13,047	ne.	36	se.	13	13	14	4	4.6	
Tampa	35	79	96	30.07	30.11	− .01	61.3	+ 1.8	80	29	70	36	5	53	27	55	53	81	7.36	+ 5.3	8	6,276	ne.	35	sw.	14	18	6	7	3.8	
East Gulf States.							**49.0**	**− 0.1**										**77**	**6.54**	**+ 2.0**										**6.0**	
Atlanta	1,174	190	216	28.84	30.10	− .06	44.0	− 0.6	64	30	51	23	5	37	24	39	33	71	5.45	+ 0.9	13	10,124	nw.	48	nw.	4	12	3	16	5.7	T.
Macon	370	55	66	29.70	30.10	− .06	47.4	+ 0.6	71	30	56	25	6	38	32	...	...	...	7.01	+ 2.6	14	3,646	nw.	25	w.	23	12	6	13	5.5	
Thomasville	273	8	58	29.82	30.12	− .03	51.1	− 1.4	77	30	61	27	5	41	35	46	43	84	9.33	+ 5.6	12	4,443	nw.	26	w.	4	7	9	15	6.6	
Pensacola	56	79	96	30.04	30.10	− .05	53.3	− 0.6	76	30	60	32	5	46	24	...	...	...	11.06	+ 6.9	15	8,106	ne.	45	e.	13	12	5	14	5.7	
Anniston	741	9	58	29.30	30.11	− .05	44.0	− 0.2	66	30	53	20	5	35	31	...	...	...	4.78	+ 0.2	13	5,311	se.	39	se.	13	8	6	17	6.7	
Birmingham	700	136	144	29.33	30.11	− .05	46.4	− 0.9	67	30	54	21	5	39	29	41	37	76	4.00	− 0.6	12	5,955	se.	30	ne.	13	10	6	15	6.3	
Mobile	57	98	106	30.04	30.10	− .05	52.5	+ 1.0	76	30	60	32	5	45	24	48	45	82	8.24	+ 3.7	12	5,363	n.	27	nw.	4	8	7	16	6.0	
Montgomery	223	100	112	29.87	30.12	− .04	48.2	− 0.9	69	30	56	27	5	41	30	44	39	75	7.14	+ 2.6	11	5,195	nw.	29	nw.	30	7	7	17	6.4	
Meridian	375	84	93	29.69	30.10	− .06	47.2	+ 0.3	70	9	56	23	5	38	35	43	40	81	4.72	− 0.5	10	4,497	ne.	28	e.	13	10	6	15	6.0	
Vicksburg	247	62	74	29.81	30.10	− .05	50.7	+ 1.3	77	28	58	28	5	43	28	45	39	71	3.31	− 1.7	9	5,910	e.	30	e.	13	10	8	13	5.4	
New Orleans	51	88	121	30.03	30.09	− .04	54.3	− 0.1	76	29	61	34	5	47	24	50	46	79	6.88	+ 2.4	11	6,934	e.	37	nw.	12	13	3	15	5.5	
West Gulf States.							**50.5**	**+ 1.8**										**73**	**2.46**	**− 0.4**										**4.6**	
Shreveport	249	77	84	29.80	30.08	− .05	50.4	+ 0.5	78	28	59	28	5	42	26	44	39	71	3.82	− 0.6	8	5,874	se.	27	w.	9	15	8	8	4.6	
Bentonville	1,303	11	44	28.63	30.03	− .10	40.4	+ 2.9	71	27	49	19	19	32	33	...	...	...	1.95	− 0.8	9	5,555	s.	30	s.	26	14	5	12	5.4	5.2
Fort Smith	457	79	94	29.55	30.04	− .09	44.4	+ 2.7	75	27	53	21	19	36	31	39	34	72	2.79	− 0.1	6	7,504	e.	38	e.	12	10	9	12	5.4	T.
Little Rock	357	139	147	29.68	30.07	− .07	46.2	+ 2.7	71	27	53	27	5	39	26	41	36	71	2.63	− 1.6	8	7,536	nw.	36	s.	8	9	10	12	5.8	
Corpus Christi	20	48	58	30.06	30.08	− .04	59.7	+ 3.1	81	29	68	44	14	52	36	54	50	76	1.45	+ 0.1	6	6,146	n.	25	nw.	9	13	12	6	4.4	
Fort Worth	670	106	114	29.34	30.06	− .06	49.3	+ 1.8	80	29	58	32	4	40	35	...	...	...	2.18	+ 1.0	4	8,503	nw.	35	nw.	9	14	14	3	4.2	
Galveston	54	106	112	30.03	30.09	− .03	56.6	+ 0.3	69	17	62	44	10	52	22	53	50	82	4.04	+ 0.3	9	9,454	se.	44	se.	21	12	10	9	4.7	
Palestine	510	73	79	29.52	30.06	− .06	51.0	+ 1.6	76	27	59	30	5	43	27	45	40	73	3.16	− 0.5	5	6,734	s.	28	n.	26	13	7	11	4.9	
San Antonio	701	80	91	29.33	30.07	− .04	54.6	+ 1.5	76	28	65	35	19	45	34	47	41	67	0.80	− 0.8	6	5,159	ne.	31	nw.	22	16	10	5	3.4	
Taylor	583	55	63	29.45	30.07	− .04	52.0	+ 1.4	74	27	61	33	19	43	35	...	...	...	1.82	− 0.8	7	6,251	n.	31	s.	27	17	7	7	3.7	
Ohio Val. and Tenn.							**38.3**	**+ 1.2**										**77**	**2.90**	**− 0.5**										**7.2**	
Chattanooga	762	106	112	29.29	30.12	− .04	45.0	+ 0.4	67	28	51	22	6	35	29	38	33	74	3.70	− 0.7	12	4,705	sw.	31	sw.	30	10	5	16	6.1	T.
Knoxville	1,004	93	100	29.02	30.10	− .06	40.8	+ 1.1	66	28	48	20	6	33	29	36	32	77	3.72	− 0.4	12	3,871	sw.	31	w.	30	5	4	22	7.6	T.
Memphis	399	76	97	29.66	30.09	− .06	45.4	+ 1.9	69	28	52	27	5	39	25	41	37	76	3.03	− 1.4	9	7,233	s.	36	nw.	30	11	4	16	5.9	T.
Nashville	546	79	91	29.50	30.10	− .05	42.4	+ 1.3	69	28	50	25	5	35	26	38	33	72	2.69	− 1.1	13	4,985	s.	33	nw.	30	9	5	17	6.6	T.
Lexington	989	75	102	28.97	30.07	− .07	36.7	+ 0.3	62	27	44	17	5	30	29	...	...	...	2.28	− 1.0	16	8,889	w.	48	w.	30	3	4	24	8.4	2.4
Louisville	525	111	132	29.48	30.08	− .06	39.0	+ 0.9	63	29	46	21	5	32	30	35	30	75	3.27	− 0.5	15	6,787	sw.	36	w.	30	4	8	19	7.6	0.5
Evansville	431	72	82	29.57	30.05	− .08	39.1	+ 2.7	62	9	45	22	5	33	30	...	...	...	3.70	− 0.1	11	6,178	s.	34	s.	27	4	8	19	7.2	1.1
Indianapolis	822	154	164	29.13	30.04	− .08	34.3	+ 1.7	60	27	40	18	5	28	28	31	28	80	3.23	+ 0.2	14	8,337	s.	38	s.	27	4	4	23	8.1	1.5
Cincinnati	628	152	160	29.37	30.07	− .06	37.1	+ 0.7	63	27	44	18	5	30	28	33	28	78	2.38	− 0.6	17	5,866	sw.	32	w.	30	6	4	21	7.3	2.5
Columbus	824	173	222	29.14	30.04	− .08	34.6	+ 1.8	58	27	40	15	5	28	25	31	28	80	1.85	− 0.9	13	10,195	nw.	45	w.	30	5	7	19	7.1	2.5
Pittsburg	842	336	352	29.11	30.04	− .07	35.2	+ 0.5	64	9	42	18	13	28	31	32	27	73	3.03	+ 0.3	15	8,553	w.	54	w.	30	3	9	19	7.2	3.4
Parkersburg	638	77	84	29.39	30.07	− .07	37.1	+ 1.9	65	27	44	20	13	30	33	33	28	82	2.63	− 0.1	14	4,898	sw.	31	w.	30	5	7	19	7.5	1.5
Elkins	1,940	41	50	27.96	30.10	− .02	32.9	+ 0.4	62	8	43	3	20	23	37	29	26	83	3.41	0.0	19	3,444	w.	30	w.	30	3	11	17	7.5	10.8
Lower Lake Region.							**31.7**	**+ 2.4**										**80**	**3.82**	**+ 0.9**										**8.0**	
Buffalo	767	178	206	29.11	29.96	− .10	32.3	+ 2.2	54	9	37	16	4	28	25	30	27	81	4.28	+ 0.9	20	14,451	w.	62	w.	31	0	9	22	8.2	13.8
Canton	448	10	71	29.46	29.96	...	25.2	+ 2.5	55	9	32	− 7	4	18	28	...	...	...	4.36	+ 0.8	16	9,540	sw.	44	w.	31	2	9	20	8.4	20.1
Oswego	335	76	91	29.55	29.96	− .10	31.8	+ 2.6	53	10	37	14	4	27	20	31	28	85	5.80	+ 2.2	17	9,468	s.	36	w.	31	1	4	26	8.9	31.4
Rochester	523	81	102	29.39	29.98	− .08	32.2	+ 3.3	54	9	38	18	4	28	25	29	25	77	2.92	0.0	14	7,687	sw.	38	w.	31	2	3	26	8.6	11.6
Syracuse	597	97	113	29.32	29.98	− .09	31.8	+ 3.5	54	10	37	16	4	26	25	...	...	...	2.74	+ 0.1	14	10,588	sw.	60	s.	30	1	8	22	8.8	13.8
Erie	713	92	102	29.19	29.98	− .09	34.0	+ 2.3	58	27	40	18	3	28	28	...	...	...	3.41	+ 0.4	16	9,818	sw.	44	s.	29	3	7	21	8.0	13.5
Cleveland	762	190	201	29.16	30.00	− .09	33.4	+ 2.3	57	27	40	16	13	27	28	30	25	76	2.47	− 0.1	16	12,858	sw.	48	nw.	30	4	3	24	8.1	12.0
Sandusky	629	62	70	29.30	30.00	− .09	33.2	+ 2.1	60	8	39	15	5	27	28	...	...	...	3.40	+ 1.0	13	7,108	sw.	32	nw.	30	5	6	20	7.5	5.1
Toledo	628	207	246	29.31	30.01	− .07	32.5	+ 2.0	58	8	38	17	5	27	25	29	26	81	4.21	+ 1.9	18	11,697	sw.	42	nw.	30	3	10	18	7.1	6.7
Detroit	730	218	258	29.18	30.00	− .07	30.5	+ 1.0	53	27	36	15	5	25	28	28	26	85	4.62	+ 2.2	14	11,310	sw.	46	nw.	31	5	6	20	7.5	13.0
Upper Lake Region.							**26.1**	**+ 1.9**										**85**	**1.87**	**− 0.3**										**7.4**	
Alpena	609	13	92	29.27	29.96	− .06	25.4	+ 0.6	46	27	32	8	11	19	25	24	22	87	1.91	− 0.3	14	7,998	sw.	36	s.	26	4	6	21	7.8	15.0
Escanaba	612	40	82	29.29	29.98	− .05	24.5	+ 2.9	45	27	32	4	25	17	31	22	18	78	1.41	− 0.3	10	7,254	sw.	32	e.	14	7	6	18	6.7	8.4
Grand Haven	632	54	92	29.27	29.98	− .07	31.0	+ 0.9	49	9	35	12	4	27	19	29	27	83	2.79	+ 0.3	14	10,053	sw.	38	sw.	31	2	7	22	8.4	19.2

TABLE I.—*Climatological data for U. S. Weather Bureau stations, December, 1907*—Continued.

Stations.	Elevation of instruments: Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches: Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Departure from normal.	Days with .01, or more.	Wind: Total movement miles.	Prevailing direction.	Maximum velocity: Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
Up. Lake Reg—Cont.																															
Grand Rapids	707	121	162	29.20	29.99	— .06	22.7	+ 0.9	53	27	35	16	4	24	20	28	27	88	2.60	+ 0.1	17	8,289	s.	35	nw.	10	3	5	23	8.5	13.8
Houghton	668	66	74	29.20	29.95	— .07	23.0	+ 2.1	42	6	30	— 3	26	16	40	.....	.....	.....	0.70	— 1.8	13	4,257	e.	26	n.	9	3	11	17	7.5	13.7
Marquette	734	77	116	29.14	29.97	— .05	25.2	+ 2.3	45	7	32	7	25	19	28	23	18	75	1.34	— 1.2	13	8,196	w.	37	sw.	26	3	12	16	7.1	13.7
Port Huron	638	70	120	29.26	29.98	— .08	28.6	+ 1.3	51	9	34	12	5	23	28	27	24	86	2.75	+ 0.6	14	9,638	sw.	36	sw.	31	4	5	22	8.2	18.6
Sault Sainte Marie	614	40	61	29.25	29.97	— .03	21.8	+ 1.3	41	27	28	— 1	11	15	25	21	18	84	1.37	— 1.0	15	6,410	sw.	38	nw.	24	3	5	23	8.3	6.2
Chicago	823	140	310	29.10	30.01	— .07	32.8	+ 3.5	58	27	38	19	31	28	21	31	28	82	2.73	+ 0.7	13	11,559	sw.	42	ne.	14	6	3	22	7.4	12.8
Milwaukee	681	122	139	29.25	30.01	— .05	28.2	+ 2.2	49	27	34	13	11	22	22	27	24	83	2.23	+ 0.3	13	8,099	w.	42	e.	29	9	5	17	6.1	11.5
Green Bay	617	49	86	29.29	29.98	— .06	23.8	+ 2.5	44	8	31	7	31	17	31	22	19	80	2.05	+ 0.2	11	7,515	sw.	42	ne.	14	8	7	16	6.8	15.0
Duluth	1,133	11	47	28.70	29.98	— .07	19.6	+ 1.9	47	6	27	— 8	28	12	34	18	15	84	0.54	— 0.7	8	9,559	sw.	44	w.	27	9	10	12	5.8	7.3
North Dakota.							**20.0**	**+ 8.1**										**82**	**0.37**	**— 0.3**										**5.3**	
Moorhead	940	8	57	28.96	30.02	— .06	19.8	+ 9.1	46	6	29	—14	25	11	41	18	16	90	0.51	— 0.2	7	5,990	s.	24	nw.	23	11	7	13	5.5	6.1
Bismarck	1,674	8	57	28.16	30.02	— .06	22.9	+ 7.9	56	5	35	— 7	31	11	46	18	14	77	0.32	— 0.3	5	5,619	nw.	44	nw.	24	13	7	11	5.0	3.2
Devils Lake	1,482	11	44	28.32	29.96	— .10	18.2	+10.2	51	6	28	—18	25	8	32	14	10	77	0.39	— 0.4	5	7,055	sw.	38	ne.	24	13	6	12	5.3	3.9
Williston	1,875	14	56	27.90	29.96	— .10	18.9	+ 5.3	53	5	31	—18	27	7	41	16	12	83	0.26	— 0.4	5	5,239	s.	40	nw.	24	7	16	8	5.4	2.5
Upper Miss. Valley.							**31.6**	**+ 4.5**										**80**	**1.33**	**— 0.5**										**6.5**	
Minneapolis	.....	102	208	.....	.....	.....	25.0	.....	47	6	33	— 2	28	17	38	.....	.....	.....	0.58	— 0.4	7	7,951	w.	38	nw.	9	8	8	15	6.2	7.3
St. Paul	837	171	179	29.06	30.00	— .08	25.0	+ 5.7	45	8	33	— 1	28	18	36	23	19	76	0.49	— 0.6	6	6,716	se.	37	n.	30	7	9	15	6.8	5.3
La Crosse	714	71	87	29.21	30.01	— .07	26.4	+ 3.6	46	8	34	7	31	19	26	.....	.....	.....	0.89	— 0.4	7	4,062	nw.	23	n.	9	6	8	17	7.0	8.8
Madison	974	70	78	28.92	30.01	— .07	26.6	+ 3.9	45	27	32	10	30	21	23	25	23	86	1.35	— 0.4	9	7,745	nw.	42	ne.	14	8	9	14	6.3	6.9
Charles City	1,015	8	58	28.90	30.02	— .08	25.4	+ 6.4	48	23	34	1	4	16	33	23	22	90	0.77	— 0.5	5	5,308	nw.	27	nw.	9	4	9	18	7.2	7.6
Davenport	606	71	79	29.34	30.02	— .08	31.8	+ 4.6	53	8	38	14	31	26	24	30	26	79	0.49	— 1.2	8	5,349	sw.	26	nw.	30	9	5	17	6.5	2.0
Des Moines	861	84	101	29.08	30.01	— .10	31.2	+ 5.5	52	6	39	11	30	23	27	28	24	78	1.01	— 0.3	6	5,973	sw.	27	sw.	5	6	9	16	6.9	4.3
Dubuque	698	100	117	29.26	30.04	— .06	29.2	+ 4.7	49	27	36	9	30	22	27	27	24	80	0.67	— 1.0	6	4,882	nw.	32	s.	24	8	9	14	6.2	3.8
Keokuk	614	64	77	29.34	30.04	— .08	34.9	+ 5.5	60	27	42	17	4	28	28	31	28	79	1.38	— 0.5	8	5,838	nw.	28	nw.	30	9	8	14	5.8	3.6
Cairo	356	87	93	29.68	30.07	— .08	40.8	+ 2.3	64	28	47	23	5	34	27	37	33	75	2.48	— 0.8	11	7,108	s.	37	nw.	30	7	8	16	6.7	0.9
La Salle	536	56	64	29.45	30.04	— .05	31.2	+ 3.7	59	27	37	13	1	25	25	.....	.....	.....	1.56	— 0.7	9	5,840	w.	31	e.	29	8	6	17	6.9	6.4
Peoria	609	11	45	29.35	30.03	— .08	32.6	+ 4.5	62	27	40	14	4	26	27	30	27	82	1.66	— 0.7	11	6,785	s.	35	w.	30	9	6	16	6.0	2.5
Springfield, Ill	644	10	92	29.32	30.03	— .09	34.4	+ 3.1	66	27	41	20	4	28	26	32	28	80	2.79	+ 0.4	10	7,118	s.	28	nw.	30	7	8	16	6.8	7.0
Hannibal	534	75	109	29.44	30.03	— .09	35.2	+ 3.9	65	27	42	16	19	28	29	.....	.....	.....	1.75	+ 0.1	8	7,283	sw.	34	sw.	29	8	8	15	6.3	4.4
St. Louis	567	208	217	29.40	30.02	— .11	38.0	+ 2.5	69	27	44	23	4	32	28	35	31	77	2.06	— 0.2	9	8,736	s.	42	w.	30	5	14	12	6.4	6.5
Missouri Valley.							**32.4**	**+ 5.5**										**75**	**0.91**	**— 0.1**										**5.8**	
Columbia, Mo	784	11	84	29.18	30.08	— .09	36.2	+ 3.3	67	26	44	15	11	28	36	.....	.....	.....	1.26	— 0.8	5	6,905	s.	30	nw.	30	11	8	12	5.3	7.0
Kansas City	963	116	181	29.00	30.04	— .08	36.2	+ 4.7	59	8	43	14	19	29	25	33	29	76	0.97	— 0.4	7	9,653	s.	46	nw.	9	11	6	14	6.0	3.6
Springfield, Mo	1,324	98	104	28.59	30.03	— .10	38.4	+ 2.9	70	27	46	19	19	31	27	34	30	77	1.90	— 0.8	9	8,563	se.	34	s.	27	13	5	13	5.5	8.0
Iola	984	40	47	28.96	30.04	— .08	38.0	+ 5.5	64	8	46	21	18	30	30	.....	.....	.....	2.21	+ 1.3	9	6,448	sw.	32	n.	9	4	14	13	6.7	5.6
Topeka	.....	85	89	.....	.....	.....	35.8	+ 4.7	61	8	44	8	19	28	32	.....	.....	.....	0.60	— 0.3	8	6,268	s.	34	n.	9	5	13	13	6.2	2.9
Lincoln	1,189	11	84	28.72	30.03	— .09	31.4	+ 4.5	52	6	40	5	19	23	27	27	23	75	0.27	— 0.4	6	7,035	s.	46	n.	9	10	9	12	5.6	2.2
Omaha	1,105	115	121	28.81	30.04	— .07	32.0	+ 4.9	52	6	39	8	30	25	28	28	25	79	0.37	— 0.5	7	6,182	s.	40	nw.	9	6	9	16	6.8	2.0
Valentine	2,598	47	54	27.23	30.02	— .08	28.9	+ 4.4	64	5	42	— 2	20	16	43	24	19	72	0.57	0.0	7	6,671	nw.	42	nw.	8	14	10	7	4.6	5.7
Sioux City	1,135	96	164	28.78	30.04	— .08	28.4	+ 5.8	52	6	37	2	30	20	30	.....	.....	.....	0.90	+ 0.2	7	8,542	nw.	58	nw.	24	9	9	13	6.0	6.4
Pierre	1,572	70	75	28.30	30.02	— .08	28.6	+ 8.5	62	26	40	2	30	18	41	24	18	66	0.34	— 0.2	3	5,525	nw.	46	nw.	24	9	11	11	5.2	1.9
Huron	1,306	56	67	28.58	30.03	— .07	24.9	+ 9.2	57	26	38	— 7	30	12	43	21	17	78	0.58	0.0	4	6,571	se.	51	nw.	24	11	10	10	5.2	4.5
Yankton	1,238	49	57	28.67	30.03	— .08	29.6	+ 7.4	57	7	39	2	30	20	36	.....	.....	.....	0.93	+ 0.2	5	5,200	nw.	36	nw.	24	4	11	16	7.0	4.9
Northern Slope.							**25.8**	**+ 2.4**										**75**	**0.65**	**— 0.3**										**5.4**	
Havre	2,505	11	44	27.22	29.94	— .11	24.2	+ 8.0	54	1	36	—11	20	13	50	21	19	86	0.19	— 0.4	5	6,163	w.	49	w.	24	12	12	7	4.7	1.9
Miles City	2,371	26	48	27.40	30.04	— .06	26.4	+ 5.4	59	1	38	— 8	20	15	37	22	19	81	0.32	— 0.3	4	3,444	s.	36	sw.	23	15	13	3	3.4	2.3
Helena	4,110	8	56	25.73	30.04	— .09	28.6	+ 3.8	51	7	37	1	19	20	29	24	18	66	0.23	— 0.6	6	4,604	sw.	39	sw.	24	7	9	15	6.6	2.1
Kalispell	2,962	8	34	26.88	30.02	— .05	27.3	+ 3.4	42	5	33	6	17	22	21	25	23	84	1.02	— 0.8	15	3,119	nw.	31	sw.	24	1	7	23	8.5	8.1
Rapid City	3,234	46	50																												
Cheyenne	6,088	56	64	23.90	30.05	— .06	29.2	+ 0.2	61	4	40	0	17	18	37	23	15	57	0.55	+ 0.2	4	8,505	nw.	56	w.	24	12	13	6	4.7	5.5
Lander	5,372	26	36	24.58	30.15	.....	19.3	+ 0.1	53	1	33	—27	19	6	42	16	12	76	1.14	+ 0.4	5	1,883	sw.	36	sw.	26	11	13	7	4.8	11.2
Sheridan	3,790	5	.....	26.01	30.05		25.6	.....	58	3	39	—14	20	12	43	21	16	79	0.22	.....	3	1,728	nw.	32	nw.	24	12	8	11	5.1	3.6
Yellowstone Park	6,200	11	48	23.79	30.11	— .05	21.6	0.0	47	4	30	—11	18	13	31	19	14	70	0.94	— 0.9	13	6,064	s.	42	sw.	25	5	15	11	6.0	10.8
North Platte	2,821	11	51	27.05	30.08	— .02	30.0	+ 3.4	66	5	43	— 5	19	17	48	24	21	81	0.80	+ 0.3	7	4,535	w.	38	n.	8	12	8	11	5.0	7.1
Middle Slope.							**35.6**	**+ 2.7**										**68**	**0.98**	**+ 0.2**										**5.2**	
Denver	5,291	129	136	24.65	30.03	— .05	33.8	+ 1.6	67	4	47	4	18	21	40	27	18	57	0.45	— 0.2	7	5,623	s.	43	w.	24	12	14	5	4.4	6.1
Pueblo	4,685	80	86	25.23	30.01	— .07	34.2	+ 2.5	67	1	49	1	18	20	48	26	14	48	0.06	— 0.4	1	5,392	nw.	52	nw.	26	15	13	3	3.6	0.3
Concordia	1,398	42	50	28.54	30.06	— .05	32.2	+ 2.7	59	1	41	1	19	24	30	29	25	79	0.93	+ 0.4	5	4,518	nw.	30	n.	9	7	10	14	6.0	6.1
Dodge	2,509	44	54	27.37	30.05	— .05	34.1	+ 2.5	70	1	44	12	18	24	42	28	23	72	0.83	+ 0.3	7	6,664	nw.	36	nw.	9	9	13	9	5.4	7.5
Wichita	1,358	78	86	28.58	30.05	— .06	38.0	+ 3.8	64	8	46	10	18	30	35	34	29	74	1.61	+ 0.8	8	6,727	nw.	36	n.	9	6	14	11	6.1	1.2
Oklahoma	1,214	10	47	28.72	30.08	— .08	41.6	+ 3.0	67	8	51	19	4	32	36	37	33	78	2.02	+ 0.3	8	12,355	s.	47	nw.	9	11	10	10	5.5	
Southern Slope.							**45.4**	**+ 1.7**										**68**	**0.67**	**— 0.4**										**4.0**	
Abilene	1,738	45	54	28.22	30.05	— .06	48.3	+ 3.3	77	27	50	26	18	38	32	41	34	66	1.01	— 0.1	2	7,028	s.	31	s.	11	14	13	4	3.9	
Amarillo	3,676	10	49	26.21	30.00	— .09	38.3	+ 1.9	71	1	50	12	18	26	37	32	28	75	1.46	+ 0.6	2	9,773	s.	48	w.	14	15	11	5	4.6	14.0
Del Rio	944	8	57	29.08	30.08	— .02	52.5	+ 0.1	82	28	65	30	23	40	46	.....	.....	.....	0.05	— 1.5	3	5,117	se.	38	nw.	22	18	8	5	3.4	
Roswell	3,578	9	57	26.31	30.00	— .07	42.6	+ 1.4	71	26	58	17	18	27	47	34	27	64	0.15	— 0.4	1	5,252	nw.	40	nw.	14	13	15	3	4.0	1.5
Southern Plateau.							**43.8**	**+ 1.7**										**52**	**0.22**	**— 0.8**										**2.9**	
El Paso	3,762	10	110	26.22	30.04	+ .01	48.2	+ 3.4	73	28	62	27	22	34	40	36	23	43	T.	— 0.5	0	7,019	nw.	45	w.	11	20	10	1	2.5	
Santa Fe	7,013	33	39	23.19	30.09	+ .03	31.0	+ 0.7	52	2	42	10	22	20	29	24	18	64	0.40	— 0.4	4	7,038	ne.	34	nw.	29	21	7	3	2.9	3.0
Flagstaff	6,907	8	57	23.34	30.04	— .02	32.4	+ 4.0	56	24	46	10	18	19	38	25	19	66	0.47	— 1.5	5	5,479	n.	30	sw.	11	15	9	7	4.3	4.0
Phoenix	1,108	50	56	28.88	30.05	+ .01	52.7	+ 0.8	77	1	67	30	22	38	36	41	28	42	T.	— 0.6	0	2,609	e.	22	sw.	11	19	12	0	2.7	
Yuma	141	16	46	29.90	30.05	.00	56.4	+ 0.7	79	1	72	34	19	41	40	43	30	41	0.00	— 0.4	0	4,042	ne.	30	n.	21	26	3	2	1.6	
Independence	3,910	11	42	26.03	30.07	— .05	42.0	+ 0.4	68	26	55	21	16	29	36	34	26	57	0.42	— 1.1	3	4,212	nw.	34	n.	19	18	9	4	3.4	
Middle Plateau.							**33.6**	**+ 2.9**										**70**	**1.22**	**+ 0.1**										**5.9**	
Reno	4,532	56	68	25.48	30.10	— .05	37.4	+ 3.7	58	4	47	17	29	28	36	32	28	75	1.47	— 0.2	9	4,134	sw.	48	sw.	4	8	12	11	5.9	2.4
Tonopah	6,089	12	20	24.07	30.16	......	35.8	+ 5.7	55	1	42	18	29	29	20	29	21	56	0.21	— 0.6	4	7,155	se.	43	nw.	11	10	19	2	4.5	2.6
Winnemucca	4,344	18	56	25.64	30.11	— .07	35.0	+ 4.3	60	4	45	14	29	25	42	31	28	81	1.92	+ 0.9	12	6,194	sw.	47	sw.	13	3	9	19	7.6	6.2
Modena	5,479	10	43	24.62	30.08	— .04	33.2	+ 1.5	56	23	46	11	18	21	39	28	24	73	0.34	— 0.5	5	6,779	w.	46	sw.	7	9	7	15	5.9	3.6
Salt Lake City	4,366	105	110	25.66	30.11	— .04	34.7	+ 2.6	56	26	42	15	29	28	31	31	26	71	2.21	+ 0.9	14	3,641	se.	39	nw.	26	4	9	18	7.0	15.5
Durango	6,546	18	56	23.62	30.11	+ .04	27.8	— 0.5	54	2	41	0	30	15	37	22	17	70	2.04	+ 0.6	7	4,016	nw.	28	n.	12	9	10	12	5.3	19.4
Grand Junction	4,608	43	51	25.43	30.09	— .01	31.4	+ 3.2	54	7	42	4	30	21	35	25	19	63	0.35	— 0.1	5	2,849	w.	18	nw.	8	12	6	13	5.4	4.0
Northern Plateau.							**34.8**	**+ 2.7**										**73**	**2.12**	**+ 0.4**										**7.4**	
Baker City	3,471	48	58	26.43	30.08	— .08	31.4	+ 4.0	50	2	38	10	18	25	23	29	25	78	1.32	— 0.2	14	4,440	se.	28	s.	13	4	8	19	7.4	13.3
Boise	2,739	78	86	27.21	30.13	— .07	36.8	+ 4.6	58	4	43	18	21	30	32	32	27	71	2.81	+ 1.1	13	4,534	se.	31	se.	12	0	8	23	8.4	2.1
Lewiston	757	10	51	29.21	30.03	— .10	38.4	+ 0.9	55	23	45	18	18	32	21	.....	.....	.....	1.19	— 0.3	11	3,963	e.	42	w.	23	2	7	22	7.9	T.
Pocatello	4,477	46	54	25.50	30.14	— .05	30.0	+ 1.6	56	4	37	— 5	18	23	38	27	23	75	2.59	+ 1.7	13	7,810	se.	36	sw.	22	7	14	10	5.7	8.8
Spokane	1,929	101	110	27.93	30.03	— .05	33.5	+ 2.7	54	4	38	12	18	29	24	31	29	82	2.58	0.0	14	5,165	s.	38	sw.	23	6	5	20	7.1	1.3
Walla Walla †	1,000	71	79	28.94	30.03	— .09	38.4	+ 2.4	63	4	44	21	19	33	34	36	33	84	2.23	+ 0.1	18	4,526	s.	36	se.	12	3	4	24	7.9	4.0
N. Pac. Coast Reg.							**43.5**	**+ 1.9**										**85**	**9.00**	**+ 1.1**										**8.2**	
North Head	211	11	56	29.66	29.88	— .15	45.8	+ 1.5	61	2	50	35	30	42	15	44	42	89	8.77	+ 1.3	25	16,632	e.	96	se.	12	1	3	27	9.1	
Port Crescent	259	12	29	29.57	29.85	— .13	40.0	+ 1.7	55	23	46	29	7	34	18	.....	.....	.....	8.77	+ 1.9	19	4,271	se.	39	ne.	12	1	6	24	8.4	
Seattle	123	185	224	29.80	29.93	— .08	43.4	+ 2.2	59	1	48	30	16	39	17	42	40	86	6.33	+ 0.3	20	6,828	se.	58	s.	13	1	3	27	8.7	T.
Tacoma	213	113	120	29.70	29.93	— .08	42.4	+ 2.1	58	4	48	26	16	37	18	.....	.....	.....	6.59	— 0.7	21	4,227	sw.	48	sw.	4	7	4	20	7.2	T.
Tatoosh Island	86	7	57	29.73	29.83	— .13	44.4	+ 0.5	60	2	48	35	17	41	14	42	38	78	10.59	— 4.0	26	17,849	e.	82	sw.	23	3	4	24	8.2	
Portland, Oreg	153	68	106	29.78	29.95	— .12	44.0	+ 2.7	59	23	49	32	8	39	19	41	39	83	9.10	+ 1.8	23	5,785	se.	40	s.	4	1	5	25	8.6	0.1
Roseburg	510	9	57	29.43	29.98	— .13	44.7	+ 2.8	64	23	51	31	15	39	24	43	41	87	12.82	+ 6.9	23	2,218	s.	20	se.	12	3	9	19	7.9	

TABLE I.—*Climatological data for U. S. Weather Bureau stations, December, 1907*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.						Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
Mid. Pac. Coast Reg.							49.4	+ 1.1										83	4.80	+ 0.2										7.5	
Eureka	62	62	80	29.98	30.05	— .07	50.4	+ 2.4	70	2	56	34	29	44	26	48	46	87	8.59	+ 1.3	23	5,873	se.	45	sw.	4	0	8	23	8.1	
Mount Tamalpais	2,375	11	18	27.61	30.11	— .01	45.8	......	68	1	50	35	29	42	17	43	39	54	6.10	+ 1.8	17	14,031	nw.	78	sw.	10	4	6	21	7.9	
Point Reyes Light	490	7	18	29.55	30.07	......	52.3	......	71	1	56	45	15	49	18	....	....	....	2.63	......	14	12,689	s.	82	nw.	19	2	10	19	7.6	
Red Bluff	332	50	56	29.73	30.10	— .04	46.4	0.0	64	2	53	33	29	40	28	44	41	84	5.29	+ 0.8	12	3,949	se.	24	s.	25	1	5	25	8.8	
Sacramento	69	106	117	30.06	30.13	— .01	47.6	+ 1.3	66	1	54	34	20	42	28	45	42	82	3.33	— 0.2	12	5,631	se.	36	se.	10	7	10	14	6.6	
San Francisco	155	200	204	29.95	30.12	.00	52.4	+ 1.5	68	1	57	41	24	48	18	49	45	80	3.66	— 0.6	14	4,612	ne.	37	sw.	10	6	11	14	6.6	
San Jose	141	78	88	29.98	30.13	......	50.3	+ 0.4	72	1	59	34	2	42	37	....	....	....	3.65	— 0.6	13	4,463	se.	35	se.	30	6	10	15	6.2	
Southeast Farallon	30	9	17	30.07	30.10	......	53.5	......	66	1	56	47	29	51	12	....	....	....	3.01	— 1.2	13	9,707	nw.	61	s.	29	1	8	22	8.3	
S. Pac. Coast Reg.							54.9	+ 2.3										72	1.40	— 0.8										4.8	
Fresno	330	67	70	29.79	30.15	+ .02	48.6	+ 1.8	74	2	56	32	29	41	36	45	42	81	0.97	— 0.6	7	3,185	se.	24	e.	30	11	1	19	6.4	
Los Angeles	338	116	123	29.71	30.07	.00	58.4	+ 3.1	85	2	69	41	29	48	31	50	43	65	0.88	— 2.0	8	3,390	ne.	21	nw.	11	10	11	10	4.9	
San Diego	87	94	102	29.98	30.07	.00	57.8	+ 2.1	79	1	66	43	30	50	23	51	44	68	0.43	— 1.4	7	3,557	ne.	18	nw.	14	24	6	1	2.0	
San Luis Obispo	201	47	54	29.91	30.13	+ .02	54.9	+ 2.1	82	2	64	37	1	46	45	49	43	72	3.33	+ 1.0	13	4,241	n.	22	w.	8	9	10	12	5.8	
West Indies.																															
Grand Turk	11	6	20	30.01	30.02	+ .01	77.0	......	86	11	83	60	7	71	....	....	....	....	2.31	......	10	......	......	....	......	....	....	....	....	....	
San Juan	82	48	90	29.90	29.98	+ .01	77.0	— 0.7	84	4	82	70	26	72	12	73	71	84	7.10	+ 2.8	27	7,819	e.	32	se.	27	9	17	4	4.6	
Panama.																															
Ancon	74	....	....	......	29.83	......	81.0	......	92	29	90	70	28	73	21	....	....	....	3.46	......	17	......	......	....	......	....	9	18	4	....	
Bas Obispo	40	....	....	29.66	29.84	......	78.0	......	88	22	86	67	28	70	19	73	72	92	2.26	— 6.8	13	3,428	nw.	19	nw.	23	0	24	7	6.3	
Naos	....	....	....	29.79	29.83	......	81.6	......	93	30	89	73	28	74	19	74	73	88	1.08	......	10	6,097	nw.	27	nw.	31	16	13	2	4.1	
Christobal	....	....	....	29.82	29.84	......	79.8	......	85	5	83	72	10	76	12	76	74	84	9.36	— 2.7	24	8,862	ne.	28	ne.	26	17	10	4	4.3	

* More than one date. † Record incomplete.

TABLE II.—*Climatological record of cooperative observers, December, 1907.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alaga	......	......	......	9.44	
Ashville	67	18	43.9	4.33	
Auburn	67	25	48.0	8.15	
Boligee	69	19	47.0	4.74	
Bridgeport	......	......	......	3.65	
Camphill	......	......	......	9.19	
Cedar Bluff	......	......	......	5.05	
Citronelle	76	23	51.8	7.07	
Clanton	68	22	45.8	7.85	
Cordova	66[k]	18[k]	43.0[k]	4.92	
Cullinan	67	19	43.6	3.73	
Daphne	72[a]	33	54.4[b]	8.42	
Decatur	79	19	42.9	3.37	
Demopolis	......	......	......	5.78	
Eufaula	68	25	46.2	11.12	
Evergreen	74	25	49.6	10.12	
Florence	75	18	44.8	4.88	
Fort Deposit	69	29	46.8	7.42	
Gadsden	65	23	45.2	4.04	
Good Water	68	24	46.2	5.22	
Greensboro	69	24	47.6	7.02	
Guntersville	......	......	......	2.60	
Hamilton	69	16	44.8	4.43	
Highland Home	70	22	48.9	10.50	
Livingston	68	21	45.4	6.43	
Lock No. 4	66	19	45.1	6.36	
Lucy	77	22	50.4	9.09	
Madison Station	74	18	43.6	3.35	
Maplegrove	67	19	42.5	4.18	
Newbern	69	21	48.0	5.41	
Oneonta	66	17	42.4	4.87	T.
Opelika	70	24	47.2	8.46	
Prattville	69	22	47.1	7.69	
Pushmataha[b]	72	21	47.0	......	
Riverton	74	13	43.1	4.63	T.
Scottsboro	66	16	43.6	3.32	
Selma	69	23	46.6	5.90	
Spring Hill	77	28	52.4	8.31	
Talladega	67	19	48.0	4.62	
Thomasville	68	22	44.6	4.18	
Tuscaloosa	68	20	44.0	5.65	
Tuscumbia	71	18	43.4	4.00	
Tuskegee	71	24	49.4	7.83	
Union Springs	68	22	47.4	10.57	
Uniontown	68	22	48.0	7.88	
Valley Head	63	12	40.6	2.03	
Vienna	......	......	......	4.34	
Wetumpka	72	25	49.0	8.74	
Arizona.					
Allaires Ranch	......	......	......	0.00	
Arizona Canal Co. Dam	74	29	53.6	0.00	
Aztec	82	32	54.4	0.00	
Benson	76	18	46.8	0.00	
Bisbee	69	28	47.1	0.00	
Bonita	......	......	......	0.00	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bowie	70	23	45.7	0.00	
Buckeye	78	23	50.6	T.	
Casa Grande	91	21	57.2	0.00	
Cave Creek	74	30	55.5	0.00	
Clifton	......	......	......	0.03	T.
Cline	67	21	45.4	0.05	T.
Cochise*[1]	62	26	42.9	0.00	
Columbia	81	39	58.4	0.00	
Congress	72	38	53.8	T.	
Douglas	73	18	47.0	0.00	
Dudleyville	75	21	48.5	0.03	
Fish Creek	......	......	......	T.	
Flagstaff	52	9	32.8	0.54	7.0
Fort Apache	66	15	40.2	0.00	
Fort Huachuca	74	21	47.4	0.00	
Fort Mojave	76	33	55.2	T.	
Gila Bend	78	29	53.6	0.00	
Globe	66	25	46.8	0.08	
Grand Canyon	65	4	33.6	0.98	10.5
Greer	......	......	......	1.20	12.0
Holbrook	63	13	37.9	T.	T.
Intake	......	......	......	0.02	
Jerome	62	32	46.0	T.	T.
Keams Canyon	60	11	34.0	0.30	3.0
Kingman	71	22	47.2	T.	
Maricopa	78	23	51.5	0.00	
Mesa	81	26	51.2	T.	
Mohawk Summit	82	43	61.2	0.00	
Natural Bridge	......	......	......	0.00	
Paradise	68	18	41.6	0.00	
Parker	83	27	54.5	T.	
Phoenix (Ex. Farm)	78	26	51.1	T.	
Picacho*[5]	78	36	57.6	0.00	
Pinal Ranch	......	......	......	0.00	
Pinto	......	......	......	0.40	4.0
Prescott	63	24	43.5	0.22	1.0
Roosevelt	76[l]	21[l]	45.6[l]	0.18	
St. Michaels	51	1	30.4	0.60	4.6
San Carlos	71	21	45.4	0.04	
Salome	85	22	54.8	0.00	
San Simon	72	19	44.9	0.00	
Seligman	65	13	39.8	0.15	1.5
Sentinel	79	32	54.1	0.00	
Silverbell	73	35	57.2	T.	
Supai	69	30	46.9	T.	
Tempe	81	24	51.2	T.	
Thatcher	67	19	44.6	0.00	
Tombstone	70	26	48.7	0.00	
Tuba	62	13	35.6	0.42	
Tucson	78	20	51.4	0.00	
Upper San Pedro	78	18	46.2	0.00	
Vail*[6]	88	50	69.6	0.00	
Walnut Grove	......	......	......	0.00	
Willcox	69	17	42.0	0.00	
Yarnell	......	......	......	0.02	
Yuma	77	27	53.0	0.00	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arkansas.	°	°	°	*Ins.*	*Ins.*
Alicia	67	18	41.0	2.86	0.1
Amity	78	19	47.4	2.44	
Arkadelphia	......	......	......	2.86	
Bee Branch	72	20	44.6	1.35	
Benton	72	20	46.4	2.82	
Bergman	72	11	38.8	2.19	6.0
Brinkley	71	19	45.2	3.83	
Camden	77	21	48.8	3.53	
Center Point	77	24	47.8	2.85	
Conway	72	20	44.8	2.79	T.
Corning	66	19	42.9	2.55	0.6
Des Arc	72[e]	20[e]	45.0[e]	2.27	
Dodd City	71	13	40.7	......	......
Dutton	71	11	40.0	2.51	6.3
El Dorado	79	24	48.8	4.62	T.
England	74	22	47.3	2.84	
Fayetteville	70	16	42.0	2.75	6.0
Forrest City	71	19	44.4	2.29	
Fulton	......	......	......	2.92	
Hardy	69	19	42.2	2.04	T.
Heber	72	17	44.3	1.60	
Helena	75	21	45.2	3.47	
Hope	77	23	48.2	3.44	
Hot Springs	71	20	44.7	2.55	0.2
Jonesboro	66[e]	15[e]	41.1[e]	2.77	
Junction	78	21	48.0	4.34	
La Crosse	70[e]	20[e]	43.0[e]	1.58	T.
Lakefarm	76	20	47.1	3.18	
Lewisville	85[e]	22[e]	49.6[e]	2.80	
Lutherville	74	18	42.8	2.29	T
Malvern	71	24	46.5	3.35	
Mammoth Spring	70	16	40.7	......	
Marvell	76[d]	19[d]	46.8[d]	2.52	
Mena	72	20	44.6	2.07	
Montrose	78	20	47.7	4.33	
Mossville	67	18	38.5	1.64	1.2
Mount Nebo	66	23	45.8	2.20	0.5
Newport	66	20[j]	41.0[e]	1.50	
Pine Bluff	78	21	47.8	3.79	
Pocahontas	68	18[e]	42.6[b]	2.77	
Pond	72	13	40.2	2.25	3.5
Prescott	76	20[e]	46.2[e]	3.27	
Rogers	72	16	41.7	1.79	6.7
Russelville	72	20[d]	41.8[e]	2.19	0.5
Spielerville	75	21	44.4	1.78	
Stuttgart	73	22	46.1	3.22	
Warren	81[l]	14	46.6[e]	4.55	
Wiggs	74	16	45.0	2.64	
California.					
Alturas	60	8	35.4	1.82	T.
Angiola	62	26	43.0	0.43	
Auburn	68	32	52.3	7.35	
Azusa	88	31	54.6	0.86	
Bagdad	76	35	56.4	0.00	
Bakersfield	80	30	53.3	1.14	
Bear Valley	......	......	......	18.15	50.0

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
California—Cont'd.					
Berkeley	64	41	50.6	4.84	
Bishop	67	18	41.5	0.74	
Blocksburg	65	28	45.2	22.59	1.0
Blue Canyon	69	13	37.8	20.20	47.0
Branscomb	72	24	45.0	26.48	.....
Brush Creek	60	26	41.5	15.38	2.0
Butte Valley	.....	.....	.....	11.96	45.5
Calexico	76	38	55.9	0.00	
Campbell	72	30	49.8	4.19	
Campo	.....	.....	.....	0.12	
Cedarville	54	12	34.5	1.99	8.5
Chico	70	25	47.0	4.26	
Claremont	85	35	55.6	0.83	
Cloverdale	73	31	48.8	9.50	
Colfax	78	30	51.0	10.04	
Colusa	66	28	47.0	3.00	
Crescent City	62	33	49.4	19.63	
Crockers	.....	.....	.....	10.15	9.0
Cuyamaca	56	26	39.6	1.80	
Delta	65	29	42.3	17.61	8.5
Dobbins	78	30	49.0	9.05	
Durham	69	24	46.4	4.12	
El Cajon	88	33	55.8	0.57	
Electra	73	36	51.9	6.53	
Elmwood	69	30	47.8	2.40	
Elsinore	78	28	50.6	0.41	
Emigrant Gap	60	9	31.0	16.65	55.0
Escondido	81	27	52.1	0.98	
Folsom	75	33	49.2	5.60	
Fordyce	.....	.....	.....	17.94	104.0
Fort Ross	74	40	52.8	11.39	
Georgetown	72	24	44.8	13.62	2.0
Glendora	.....	.....	.....	0.93	
Gold Run	76	28	45.2	11.47	
Greenville	55	15	37.2	11.82	19.0
Hanford	80	25	47.3	1.58	
Healdsburg	75[e]	28[e]	49.6[e]	9.97	
Heber	85	32	58.0	0.00	
Hollister	76	29	50.0	3.61	
Idyllwild	68	23	43.8	2.64	
Indio	85	31	57.0	T.	
Iowa Hill	74	27	46.3	13.39	2.0
Isabella	.....	.....	.....	1.94	
Jamestown	73	30	46.0	6.24	
Jolon	.....	.....	.....	2.44	
Kennedy Gold Mine	.....	.....	.....	5.83	
Kentfield	.....	.....	.....	10.17	
Kernville	.....	.....	.....	1.73	
King City	72	32	53.4	2.03	
La Porte	62	13	36.6	23.15	52.1
Laytonville	.....	.....	.....	21.93	
Le Grande	68	33	47.4	1.73	
Lemoncove	77	32	50.4	2.77	
Lick Observatory	65	22	42.4	7.77	T.
Livermore	73[e]	27[e]	49.6[e]	3.90	
Lodi	63	28	47.8	3.96	
Lone Pine	70	21	42.2	0.26	
Los Gatos	71	35	51.0	8.00	
Mammoth	85	35	58.8	0.00	
Marysville	74	28	48.2	4.75	
Merced	67	28	46.4	2.66	
Mill Creek	70	18	47.6	9.17	1.0
Mills College	.....	.....	.....	4.50	
Milo	.....	.....	.....	5.32	
Milton (near)	68	36	49.4	4.08	
Mojave	70	30	61.0	0.50	
Mokelumne Hill	76	32	47.8	5.69	
Mono Ranch	66	24	44.6	2.09	
Montague	62	11	34.0	3.05	
Monterio	72	30	48.2	2.61	
Monumental	59	24	39.8	35.89	14.0
Mount St. Helena	.....	.....	.....	12.52	
Napa	70	35	47.6	4.37	
Nevada City	77	22	38.5	12.82	2.0
Newcastle	70	34	48.1	7.05	
Newman	73[g]	32[g]	49.2[g]	2.04	
Nimshew	68	22	42.6	14.37	3.1
North Bloomfield	72	18	40.8	14.39	8.0
Oakland	64	40	50.8	3.64	
Ojai Valley	88	30	54.3	1.86	
Orland	71	34	46.0	3.45	
Orleans	72	32	49.2	18.31	
Oroville (near)	66	30	47.2	5.81	
Ozena	.....	.....	.....	1.06	
Palermo	70	26	47.4	4.21	
Peachland	68	28	48.6	10.04	
Pilot Creek	.....	.....	.....	15.98	26.5
Pine Crest	82	44	58.2	2.32	
Placerville	67	26	44.0	9.54	
Point Lobos	65	44	55.3	3.65	
Porterville	76	33	50.2	1.78	
Poway	84	26	52.6	0.76	
Quincy	60	15	39.0	9.65	10.0
Redding	62	33	46.2	9.94	1.0
Redlands	81	34	53.8	0.77	
Reedley	75	30	48.1	1.45	
Represa	.....	.....	.....	6.47	
Rialto	84	42	60.0	1.88	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
California—Cont'd.					
Riverside	81	31	52.8	0.90	
Rocklin	72	30	47.8	5.73	
Rohnerville	70	35	50.8	12.05	
Sacramento	63	31	47.8	4.15	
Salinas	76	34	52.0	3.36	
San Bernardino	85	30	54.0	0.97	
San Jacinto	85	25	53.4	0.57	
San Miguel Island	.....	.....	.....	1.83	
Santa Barbara	84	38	56.0	1.80	
Santa Clara College	75	31	50.8	3.60	
Santa Cruz	80	33	51.4	5.50	
Santa Maria	78	35	53.4	1.80	
Santa Monica	87	42	55.7	1.14	
Santa Rosa	70	26	48.7	6.30	
Shasta	79	28	52.8	17.40	2.0
Sierra Madre	79	42	56.5	1.27	
Sisson	60	17	34.5	12.59	36.7
Stirling City	67	17	37.5	16.20	12.0
Stockton	66	30	47.3	3.79	
Storey	76	28	47.4	1.75	
Summerdale	69	19	40.2	9.35	26.0
Summit	64	−1	30.8	10.20	101.0
Susanville	51	11	33.7	7.01	27.0
Tamarack	56	−16	26.6	7.95	97.0
Towle	74	21	41.4	11.80	13.0
Truckee	58	−8	30.9	7.58	64.0
Tulare	.....	.....	.....	1.89	
Tulare (near)	79	27	49.0	1.98	
Tustin (near)	.....	.....	.....	1.11	
Ukiah	67	23	46.0	12.04	
Upper Lake	68	28	45.0	7.58	
Upper Mattole	.....	.....	.....	21.36	
Vacaville	71	29	49.2	4.65	
Ventura	.....	.....	.....	1.60	
Wasco	69	24	45.0	0.94	
Westpoint	.....	.....	.....	7.78	0.5
West Saticoy	.....	.....	.....	0.32	
Wheatland	66	29	47.2	3.92	
Willets	85	20	46.4	21.20	
Willows	66	29	46.4	3.31	
Woodleaf	.....	.....	.....	18.18	7.0
Yosemite	56	19	35.0	9.32	20.0
Colorado.					
Akron	.....	.....	.....	0.60	6.0
Amethyst	44	−20	18.2	0.45	5.0
Arriba	63	−6	28.0	0.05	2.0
Ashcroft	46	−15	18.2	2.97	48.0
Blaine	70	−1	34.4	0.60	5.0
Boulder	65[c]	7	36.8[d]	0.27	2.1
Breckenridge	50	−32	19.0	2.59	39.0
Buena Vista	45	−9	20.4	0.30	3.0
Calham	64	−5	26.5	1.60	13.5
Canyon	66	10	39.0	0.00	
Cascade	.....	.....	.....	3.52	43.0
Castle Rock	63	−12	28.4	1.06	14.0
Cheesman	62	−2	32.2	0.60	7.2
Chromo	68	−11	24.2	1.45	11.0
Collbran	52	−11	25.2	1.13	13.0
Colorado Springs	64	0	32.2	0.11	1.0
Cope	68	−11	27.7	0.66	7.8
Corona	31	−11	10.4	3.76	41.5
Cripple Creek	.....	.....	.....	0.24	7.0
Delta	54	1	30.0	0.56	3.2
Eads	65	−2	32.2	0.05	T.
Eagle	52	−20	22.5	0.94	11.8
Eureka	.....	.....	.....	2.21	26.0
Fort Collins	62	−5	30.5	0.03	T.
Fort Morgan	57	−8	28.4	0.14	.....
Frances	49[e]	2[e]	25.2[e]	.....	.....
Fruita	54	−3	26.8	0.66	8.5
Garnett	51	−11	22.3	0.14	2.0
Gladstone	.....	.....	.....	3.08	46.7
Gleneyre	66	−3	30.8	0.22	1.2
Glenwood Springs	51	−16	25.4	1.57	25.0
Grand Valley	56	−3	28.0	1.08	14.5
Gunnison	47	−26	15.1	1.18	16.0
Hahns Peak	34	−20	13.9	3.21	51.5
Hamps	67	−6	26.9	0.65	8.8
Hoehne	68	−14	28.2	0.60	6.0
Holly	68	4	33.8	0.62	6.0
Holyoke	60[j]	−9[j]	27.0[j]	0.98	7.5
Idaho Springs	60	3	29.4	0.28	4.5
Kosslers Reservoir	.....	.....	.....	0.31	4.2
Kremmling	43	−28	18.6	1.09	12.0
Lake City	50	−18	19.4	1.27	23.0
Lake Moraine	48	−8	22.8	0.57	10.0
Lamar	69	2	34.0	0.65	5.0
Laporte	.....	.....	.....	0.04	0.8
Las Animas	68	−2	30.6	0.50	.....
Lay	54	−25	21.2	0.75	13.5
Leroy	60	−3	29.0	0.69	8.0
Limon	68	−4	27.5	1.84	9.9
Longs Peak	.....	.....	.....	1.19	16.0
Lujane	51	1	28.5	0.66	10.0
Manassa	51	−14	23.2	0.15	2.5
Mancos	55	−4	28.4	1.27	15.0
Meeker	54	−20	24.3	1.64	20.0
Montrose	53	−5	26.9	0.55	6.0

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Colorado—Cont'd.					
Moraine	53	3	26.4	0.40	6.2
Nederland	.....	.....	.....	0.67	4.0
Pagoda	58	−11	26.6	1.92	38.0
Pagosa Springs	60	−19	22.8	1.22	14.0
Paonia	55	4	30.4	1.56	12.4
Platte Canyon	.....	.....	.....	0.74	6.2
Power House	51	−2	27.7	1.59	29.2
Rangely	.....	.....	.....	1.64	23.3
River Portal	46	−3	24.4	0.93	8.0
Rocky Ford	68	−5	31.6	0.26	4.0
Saguache	.....	.....	.....	0.43	5.0
Salida	58	−2	30.4	0.30	3.0
San Luis	56	−14	24.4	0.37	3.7
Sapinero	47	−13	19.6	2.84	34.6
Sheridan Lake	.....	.....	.....	0.13	1.0
Silverton	49	−24	17.8	3.39	48.5
Stonewall	.....	.....	.....	0.20	3.0
Terminal Dam	.....	.....	.....	2.31	38.0
Victor	47	3	26.6	0.13	2.0
Vilas	.....	.....	.....	0.61	4.0
Wagon Wheel Gap	66	−14	27.0	0.55	7.0
Waterdale	62	−2	31.6	0.04	.....
Westcliffe	58	−10	26.2	0.41	6.5
Whitepine	44	−17	15.6	2.36	42.5
Wray	65	−3	30.2	0.58	3.5
Yuma	.....	.....	.....	0.35	0.5
Connecticut.					
Bridgeport	55	16	35.4	5.49	8.7
Canton	55	2	29.3	5.36	12.5
Colchester	57	14	33.0	6.01	9.5
Falls Village	.....	.....	.....	4.55	8.8
Hawleyville	58	12	33.5	4.75	8.0
Lake Konomoc	.....	.....	.....	5.01	.....
New London	56	19	35.9	5.51	13.2
North Grosvenor Dale	59	9	31.2	3.17	.....
Norwalk	56	13	32.6	4.76	7.0
Southington	56	12	33.2	5.55	11.5
South Manchester	.....	.....	.....	4.62	13.0
Storrs	58	15	34.0	5.28	.....
Voluntown	68	9	33.8	5.66	8.0
Wallingford	55	15	34.2	5.92	11.0
Waterbury	56	12	33.5	5.81	16.0
West Cornwall	56	6	29.6	5.55	18.5
West Simsbury	.....	.....	.....	4.46	12.0
Delaware.					
Delaware City	.....	.....	.....	3.00	3.0
Dover	67	20	40.5	5.08	0.5
Milford	66	20	40.8	4.43	T.
Millsboro	67	17	39.0	4.44	T.
Newark	63	16	36.4	6.64	6.5
Seaford	62	20	39.3	3.65	T.
District of Columbia.					
West Washington	70	17	36.6	4.54	2.6
Florida.					
Apalachicola	71	30	54.7	11.91	
Arcadia	86	34	64.2	2.16	
Archer	82	27	57.0	4.57	
Avon Park	84	38	63.7	2.91	
Bartow	86	33	62.3	3.59	
Bonifay	76	25	51.4	9.41	
Brooksville	85	32	60.8	4.21	
Carrabelle	72	27	52.4	9.45	
Cedarkey	74	34	57.8	4.50	
Clermont	84	36	62.1	7.28	
De Funiak Springs	75	24	51.3	11.58	
Deland	83	31	60.3	.....	
Eustis	83	32	59.4	5.12	
Federal Point	80	35	58.2	4.80	
Fenholloway	77	28	54.2	9.17	
Fernandina	79	32	57.1	4.59	
Flamingo	83	40	67.1	1.38	
Fort Meade	85	32	62.1	2.96	
Fort Myers	82	39	64.4	2.12	
Fort Pierce	85	38	65.4	5.54	
Gainesville	79	31	56.6	4.54	
Galt	78	27	52.4	10.46	
Grasmere	79	35	59.6	.....	
Huntington	83[h]	33	58.2[d]	5.44	
Hypoluxo	82	46	68.6	1.31	
Inverness	79	31	56.7	4.07	
Jasper	74	27	54.0	9.43	
Kissimmee	84	35	62.1	3.81	
Lake City	78	25	54.4	5.36	
Macclenny	79	23	55.5	4.17	
Madison	76	28	52.2	10.87	
Malabar	85	35	63.7	2.21	
Manatee	84	37	63.2	5.19	
Merritts Island	80	38	63.2	3.43	
Miami	83	44	68.9	1.19	
Molino	78	29	51.6	11.36	
Monticello	74	28	52.8	15.64	
Mount Pleasant	77	25	52.4	11.17	
Newport	.....	.....	.....	12.09	
New Smyrna	85	35	60.6	4.95	
Ocala	82	32	59.0	4.40	
Orange City	86	30	59.2	4.26	
Orlando	82	33	61.3	4.15	
Panasoffkee	81	30	59.0	6.18	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
***Florida*—Cont'd.**					
Plant City	81	32	61.4	6.06	
Rockwell	80[e]	32[e]	58.4[e]	4.79	
St. Andrew	71	29	51.4	10.97	
St. Augustine	80	33	58.0	3.92	
St. Leo	82	32	60.5	5.99	
Switzerland	86	31	56.4	4.40	
Tallahassee	73	28	51.2	12.78	
Tarpon Springs	82	29	60.2	5.34	
Titusville	86[e]	34[b]	61.8[e]	4.04	
Wausau	78	21	50.1	8.53	
Georgia.					
Adairsville	64	20	43.0	4.04	T.
Albany	73	26	50.3	7.39	
Allapaha	76	25	50.7	......	
Americus	70	25	46.6	5.91	
Athens	66	23	43.6	6.35	
Bainbridge	72	25	55.5	9.69	
Blakely	75	22	49.2	9.43	
Camak	70	22	46.5	7.40	T.
Clayton	69	16	42.0	10.21	T.
Columbus	......	......	......	9.55	
Covington	68	21	45.1	4.23	
Cuthbert	72	21	49.0	9.07	
Dahlonega	59	18	49.6	7.87	T.
Diamond	64	13	41.5	6.57	
Dudley	72	23	49.4	6.25	
Eastman	71	22	49.2	5.29	
Eatonton	......	......	......	6.50	
Elberton	66	17	43.6	7.90	3.0
Experiment	67	23	47.1	5.52	
Fitzgerald	74	23	50.1	6.15	
Fleming	74	19	50.6	5.31	
Fort Gaines	71	25	47.0	7.65	
Gainesville	61	23	40.7	3.18	
Gillsville	66	21	43.2	5.61	
Glenville	73	25	50.7	4.72	
Greenbush	65	17	42.4	3.70	T.
Greensboro	69	19	43.7	6.36	
Griffin	68	22	45.4	6.88	
Harrison	71	20	47.2	7.11	
Hawkinsville	79	21	47.1	7.17	
Helena	72	24	50.2	6.03	
Lisbon	70	14	44.7	7.41	2.5
Lost Mountain	66	20	43.4	6.14	
Louisville	69	24	48.3	5.88	
Lumpkin	70	27	47.0	8.78	
Marshallville	71	23	48.6	8.39	
Mauzy	76	24	51.6	7.26	
Milledgeville	69	21	45.8	6.45	
Millen	73	21	48.4	4.70	
Montezuma	......	......	......	7.96	
Monticello	71	24	47.2	6.12	
Morgan	72	29	48.2	7.63	
Newnan	67	22	44.2	7.89	
Point Peter	68	18	42.8	6.78	T.
Poulan	74	21	50.0	6.45	
Putnam	......	......	......	6.74	
Quitman	75	25	52.5	10.26	
Ramsey	67	20	45.4	3.74	
Rome	65	19	42.2	4.56	
St. Marys	79	26	54.9	4.15	
Screven	75[f]	26[f]	50.2[f]	4.50	
Statesboro	73	24	49.6	4.75	
Talbotton	70	22	47.4	8.83	
Toccoa	66	19	41.8	9.73	
Valdosta	76	25	52.2	7.26	
Valona	75[e]	25[e]	52.6[e]	3.70	
Washington	67	22	44.4	7.19	T.
Way Cross	76	24	51.0	5.95	
Waynesboro	67	23	47.9	5.12	T.
West Point	71	23	44.8	7.36	
Woodbury	66	18	45.2	7.04	
Idaho.					
American Falls	53	−10	27.4	2.33	......
Blackfoot	51	−14	27.4	1.67	12.0
Bonners Ferry	44	10	29.4	2.32	16.0
Buhl	52[e]	6	31.8[e]	2.47	2.7
Burke	49	−1	26.0	5.58	36.8
Caldwell	51	12	33.8	1.92	8.0
Cambridge	50	8	31.5	4.22	21.5
Center	......	......	......	2.49	19.0
Chesterfield	53	−33	21.5	2.89	19.5
Cœur d'Alene	47	11	31.8	3.37	1.0
Dent	48	8	33.4	4.11	10.5
Driggs	51	−30	18.8	2.64	21.5
Ellerslie	59	14	34.2	3.52	3.7
Emmett	56	5	34.7	3.37	9.0
Forney	44	−23	19.1	2.48	23.2
Garnett	58[f]	17	36.6[e]	1.80	2.5
Grace	51	−17	26.6	1.33	12.5
Hot Springs	57	9	35.8	1.71	1.0
Idaho Falls	52	−17	26.7	1.52	11.0
Kellogg	50	1	31.0	2.99	3.7
Lake	40	−16	18.6	0.80	8.0
Lakeview	48	17	32.2	2.95	6.5
Landore	47	−1	24.8	7.04	66.8
Lost River	52	−19	19.6	0.64	6.0
Meadows	46	−6	25.6	2.49	31.5
***Idaho*—Cont'd.**					
Milner	53	2	31.0	2.71	7.8
Moscow	47	15	32.8	2.90	5.3
Mountain Home	52	9	33.3	2.19	1.0
Murray	45	0	27.8	3.20	11.0
Murtaugh	......	......	......	2.53	3.0
Nevens Ranch	......	......	......	3.81	7.0
Oakley	58	1	35.4	0.80	T.
Orofino	49	9	31.6	3.65	11.0
Paris	51	−19	22.9	0.83	......
Payette	58	12	32.8	1.60	5.7
Poplar	......	......	......	1.69	2.5
Porthill	45	14	30.7	2.35	18.7
Roosevelt	49[e]	−18[e]	15.6[e]	5.85	58.5
Rupert	52	−10	26.0	2.64	6.0
St. Maries	48	4	32.0	3.30	10.0
Salem	......	......	......	1.82	3.4
Salmon	46	−11	21.7	0.44	7.8
Soldier	50	−20	21.7	3.65	38.0
Standrod	......	......	......	1.18	9.1
Sugar City	49	−22	23.0	1.05	3.2
Twin Falls	59	2	32.8	1.79	5.7
Vernon	51	−16	23.4	2.54	17.7
West Lake	......	......	......	0.61	9.2
Weston	52	−10	26.4	2.03	7.5
Illinois.					
Albion	63	17	37.2	5.20	1.0
Aledo	55	11	32.0	0.54	1.7
Alexander	65	16	35.0	2.58	10.5
Antioch	52	7	29.2	2.10	7.0
Astoria	64	14	33.5	1.74	7.5
Aurora	56	9	29.4	1.07	3.7
Bement	63	16	34.0	2.96	6.0
Benton	66	28	44.2	3.71	0.1
Bloomington	61	17	33.6	3.10	9.7
Bushnell	61	11	34.2	1.51	4.0
Cambridge	58	14	32.2	0.80	3.0
Carlinville	67	15	36.0	2.45	9.0
Carlyle	......	......	......	3.70	8.5
Charleston	62	15	34.6	3.42	5.2
Chester	74	21	41.4	3.58	......
Cisne	66	18	37.9	2.96	......
Coatsburg	62[d]	14[d]	34.8[d]	1.75	4.0
Cobden	65	18	38.6	3.10	......
Colchester	60	11	34.0	1.56	3.5
Decatur	63	18	34.0	2.89	10.3
Dixon	54[e]	15[a]	31.4[j]	0.59	......
Dwight	60	6	30.6	3.01	11.0
Equality	65	17	40.4	3.73	1.8
Flora	66	14	36.6	3.33	1.1
Friendgrove	63	18	37.2	4.99	0.8
Galva	57	11	30.2	1.11	4.0
Greenville	66	19	36.2	3.63	8.6
Griggsville	65	13	35.4	0.52	1.7
Havana	63	18	34.4	2.41	5.3
Henry	61	14	32.6	1.23	7.0
Hillsboro	67	18	36.6	3.36	9.0
Hoopeston	60	13	32.4	3.88	13.8
Joliet	60	7	31.2	2.47	12.1
Kishwaukee	53	8	29.0	1.23	7.0
La Grange	56	11	29.8	1.81	12.3
La Harpe	60[e]	14[e]	33.4[e]	1.26	5.0
Lanark	51	2	28.0	0.93	2.3
Lincoln	64	15	35.2	3.82	5.0
Loami	......	......	......	2.51	6.5
McLeansboro	64	18	38.2	4.12	1.5
Martinsville	64[e]	14[e]	35.6[e]	2.20	4.5
Martinton	58[e]	8[a]	29.5[b]	5.68	8.5
Mascoutah	71	19	38.7	3.45	6.0
Minonk	60	13	31.6	2.46	8.7
Monmouth	57	14	32.4	1.49	4.4
Morrison	56	8	30.7	1.01	4.0
Morrisonville	64	15	34.7	2.63	7.4
Mount Vernon	68	18	39.1	3.50	0.2
New Burnside	63	16	37.4	3.16	1.4
Olney	64	17	37.6	3.52	2.8
Ottawa	53	11	30.8	1.79	4.7
Palestine	60[f]	21[f]	34.6[f]	3.34	......
Pana	66	17	35.4	3.97	8.5
Paris	63	19	33.4	3.10	6.0
Philo	62	11	32.8	3.46	5.3
Pontiac	61	13	32.5	3.05	10.0
Rantoul	61	14	33.0	2.71	9.1
Raum	64	16	38.6	4.12	2.8
Riley	51	7	29.2	1.16	6.0
Robinson	62	17	37.6	3.66	T.
Rockford	52	15	31.6	0.17	......
Rushville	63	16	35.4	2.00	7.0
St. Charles	56	10	30.4	1.95	7.0
St. John	67	18	38.6	3.53	2.0
Streator	62	10	30.5	1.41	6.0
Sullivan	67	16	34.8	2.15	4.5
Sycamore	53	6	28.0	1.17	4.5
Tilden	69	16	38.7	4.05	6.0
Tiskilwa	......	......	......	1.36	7.0
Tuscola	65	14	32.8	3.19	7.0
Urbana	62	13	32.1	3.32	6.5
Vernon	68	17	36.8	3.46	8.0
Walnut	57	10	31.5	0 92	3.4
***Illinois*—Cont'd.**					
Warsaw	......	......	......	1.50	2.2
Windsor	64	14	34.4	3.22	11.8
Winnebago	56	7	28.4	1.77	13.0
Yorkville	57[f]	7	29.6[c]	0.83	2.0
Zion	51	9	28.5	0.35	3.0
Indiana.					
Anderson	60	10	33.4	3.49	3.4
Auburn	66[h]	4[h]	27.3[b]	5.18	......
Bloomington	......	......	......	4.10	1.0
Bluffton	62	6	31.6	4.95	2.3
Butlerville	60	10	35.5	3.65	3.5
Cambridge City	61	7	31.4	4.10	2.0
Collegeville	60[g]	17[g]	34.0[g]	2.14	......
Columbus	61	11	35.4	3.70	1.5
Connersville	61	9	33.4	3.74	1.5
Delphi	60	9	30.8	5.53	9.5
Elkhart	56	15	30.4	3.49	18.1
Eminence	59	13	34.8	3.11	1.3
Farmersburg	62	18	35.4	4.20	1.0
Farmland	60	10	33.4	3.90	2.5
Fort Wayne[k]	59	7	30.4	......	......
Franklin	61	12	34.6	2.84	1.1
Greenfield	59	13	34.4	4.04	0.5
Greensburg	59	13	35.4	4.54	4.7
Hammond	56	11	31.5	3.35	19.0
Huntington	60	10	31.8	4.52	16.6
Jeffersonville	63	17	38.0	3.82	T.
Judyville	60	10	31.6	......	......
Knox	56	10	30.6	5.00	13.4
Kokomo	60	11	34.6	3.83	2.0
La Fayette	61	15	31.6	4.61	6.8
Laporte	63	10	39.9	2.76	18.9
Lima	55	10	29.0	5.30	15.0
Logansport	61	10	32.0	4.84	5.2
Madison	61	15	36.6	3.45	T.
Marengo	66	13	38.2	5.55	2.5
Marion	60	9	32.4	4.70	6.5
Markle	60	6	31.4	3.55	6.0
Mauzy	60	9	32.9	4.59	3.2
Moores Hill	59[e]	12[e]	34.6[e]	3.59	3.0
Mount Vernon	64	19	37.6	4.57	1.0
Northfield	59	6	30.8	3.48	2.0
Paoli	64	14	37.0	3.88	1.0
Plymouth	56	8	30.0	4.60	......
Princeton	63	16	37.7	3.35	......
Richmond	59	8	33.2	3.66	0.7
Rochester	55	10	31.8	4.40	6.3
Rockville	62	16	34.2	3.21	3.0
Rome	64	16	39.6	4.88	0.8
Salamonia	61	5	32.4	1.38	2.8
Salem	62	12	35.4	5.54	0.5
Scottsburg	63	16	37.6	4.20	2.0
Shelbyville	59	10	33.8	4.58	1.5
South Bend	55	14	29.8	4.92	24.0
Terre Haute	62	20	36.3	3.62	2.0
Veedersburg	60	11	34.4	3.45	3.0
Vevay	65	14	37.3	3.50	2.5
Vincennes	63	18	36.0	5.05	T
Washington	61	17	35.5	4.31	2.5
Worthington	61	14	36.4	4.79	0.8
Zelma	62	14	36.2	4.06	2.5
Indian Territory.					
Ada	73	23	44.7	2.74	T.
Ardmore	77	25	45.4	1.85	
Bartlesville	68	20	41.6	1.88	T.
Chickasha	71	19	43.0	1.80	
Durant	72[e]	21	43.6[b]	3.15	
Fairland	71	21	41.7	2.78	0.5
Fort Gibson	......	......	......	3.63	T.
Healdton	71	15	40.7	1.99	
Holdenville	72	22	42.0	2.80	
Idabel	75	23	46.6	3.21	
Marlow	70[k]	23	40.6[f]	2.12	
Muskogee	72	20	41.7	2.85	T.
Okmulgee	73[k]	20[k]	42.9[k]	......	......
Ravia	75	25	45.6	2.97	
South McAlester	74	23	46.0	4.80	
Tulsa	71	22	42.0	2.82	T.
Vinita	70[e]	15[e]	39.9[e]	......	......
Wagoner	79	18	42.5	3.27	T.
Webbers Falls	75	20	43.0	4.35	
Iowa.					
Afton	51	7	30.3	1.24	2.5
Albia	55	9	30.1	1.22	2.2
Algona	50	2	26.0	2.03	9.0
Allerton	54	9	32.1	1.07	1.0
Alta	51	0	26.2	1.68	7.9
Alton	53	−1	27.2	1.08	8.2
Amana	51	10	30.0	0.98	2.8
Ames	55	6	29.0	0.83	3.8
Atlantic	55	6	29.2	0.26	1.5
Audubon	50	6	29.1	0.34	2.8
Baxter	52	7	28.7	0.61	2.5
Bedford	53	5	30.5	1.45	2.8
Belle Plaine	51	7	28.6	1.68	8.5
Bloomfield	58	10	32.6	0.83	3.0
Bonaparte	58	11	32.8	0.97	1.5
Boone	51	7	28.2	0.68	3.2

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	Ins.	Ins.
Britt	50	−1	25.6	1.32	5.8
Buckingham				0.31	1.3
Burlington	60	14	32.7	1.38	
Carroll	50	5	28.0	0.92	7.5
Cedar Rapids	51	10	28.9	0.69	1.5
Chariton	54	9	31.0	1.55	3.0
Clarinda	54	7	30.0	1.60	2.9
Clinton	53	11	30.4	0.88	3.5
Columbus Junction	57	12	32.7	0.69	2.0
Corning	50	8	29.8	1.71	4.2
Corydon	54	9	32.3	1.02	2.3
Creston	53	8	28.2	1.52	2.2
Cumberland				1.37	4.0
Decorah	46	2	26.6	0.93	7.5
Delaware	48	4	25.2	0.69	4.5
Denison	50[c]	6[c]	29.0[c]	0.89	3.0
De Soto	52	8	30.2	0.76	3.0
Dows	48	1	26.2	0.67	6.0
Earlham	52[j]	11[j]	30.9[j]	1.24	4.0
Elkader	49	2	27.4	0.81	4.0
Elliott	53	8	30.4	0.35	1.0
Elma	46	0	24.4	0.87	9.1
Estherville	54	3	25.0	1.65	8.0
Fayette	46	0	25.8	0.71	6.0
Forest City	53	0	25.0	1.52	9.0
Fort Dodge	48	5	27.0	0.55	5.5
Fort Madison				0.77	2.5
Gilman				0.67	2.0
Grand Meadow	46	4	26.7	0.68	5.7
Greenfield	51	9	30.4	1.96	2.6
Grinnell	51	9	29.4	0.45	4.2
Grundy Center	49	4	28.2	0.25	2.5
Guthrie Center	57	9	29.9	1.12	4.0
Hampton	52	5	27.0	1.09	9.0
Hancock	51	7	30.2	0.05	0.5
Harlan	51	6	29.1	0.36	3.0
Humbolt	48	4	28.1	0.75	8.0
Independence	49	0	27.4	0.94	4.5
Indianola	51	11	30.7	1.07	2.2
Inwood	55	−8	25.7	1.33	13.3
Iowa City	52	9	30.4	0.53	2.0
Iowa Falls	49	3	26.8	0.81	6.0
Jefferson[d]	53	6	29.4		
Keosauqua	59	12	32.0	0.83	2.0
Knoxville	54	13	31.6	0.91	3.0
Lacona				1.65	3.0
Larrabee	51	−3	26.1	1.90	9.2
Le Mars	50	−1	27.4	0.70	9.2
Lenox	50	6	30.4	1.68	3.4
Leon	55	8[e]	30.9[e]	0.68	1.5
Little Sioux	51	2	30.0	0.56	2.5
Logan	58	6	30.2	0.60	3.5
Maple Valley				1.46	6.4
Marshalltown	50	7	28.1	0.71	3.7
Mason City	46	4	25.8	0.66	6.6
Massena	54	8	31.0	0.74	2.6
Mount Ayr	52	6	31.4	1.73	2.8
Mount Pleasant	62	11	32.8	1.05	1.6
Murray	53	7	31.0	1.31	1.1
New Hampton	45	1	25.3	0.96	4.6
Newton	51	9	29.4	0.57	4.0
Northwood	51	2	25.6	2.05	15.6
Odebolt	53	4	29.4	1.02	5.5
Olin	50	6	29.6	1.07	4.0
Onawa	51	5	30.6	0.99	5.7
Osage	47	−9	23.2	1.28	7.0
Oskaloosa	54	9	31.0	1.12	3.0
Ottumwa	56	15	32.0	0.72	2.0
Pacific Junction	52	5	30.6	0.38	2.5
Perry	57	6	29.8	1.07	4.5
Plover	50	0	27.1	2.28	8.5
Pocahontas	47	4	26.2	1.69	6.0
Ridgeway	56	7	27.0	1.58	7.1
Rock Rapids	50	−4	24.7	0.65	6.5
Rockwell	48	5	27.0	1.20	10.0
St. Charles	58	10	31.9	0.96	3.4
Sheldon	56	4	26.2	1.70	13.5
Sibley	56	−5	26.3	1.10	9.8
Sigourney	56	10	31.6	0.74	4.0
Sioux Center	53	−5	26.2	1.40	12.0
Stockport	57	12	32.8	0.73	3.0
Storm Lake	50	−5	27.8	0.77	7.6
Stuart	54[f]	4[f]	30.8[f]	0.32	0.2
Thurman	51	8	31.2	2.09	1.5
Tipton	52	11	31.2	0.77	
Toledo	50	8	29.0	0.80	4.5
Wapello	55	13	33.9	0.58	1.5
Washington	54	10	31.5	0.44	
Washta	55	0	27.9	1.40	7.0
Waterloo	50	8	28.3	0.76	4.5
Waukee	49	10	29.9	1.43	8.1
Waverly	48	4	26.9	0.81	6.6
Webster City	50	1	27.9	0.45	4.5
West Bend	50	1	26.4	1.71	6.6
Whitten	49	4	27.8	0.55	5.0
Wilton Junction	50	10	30.6	0.50	
Winterset	49	10	30.4	0.76	3.0
Zearing	49	6	27.8	0.88	3.0

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Kansas.	°	°	°	Ins.	Ins.
Abilene				1.44	4.1
Anthony				3.42	2.0
Ashland	75	10	36.5	1.98	2.0
Atchison	55	8	35.0	0.24	1.5
Baker				0.81	2.5
Burlington	65	16	38.6	1.37	T.
Chapman	63	−3	34.8	1.50	4.0
Cimarron	70	8	33.5	1.80	8.5
Clay Center	59	−5	33.2	1.67	8.0
Colby	65	−4	29.2	0.78	9.0
Coldwater	71	12	36.8	1.26	3.0
Columbus	68	20	38.4	3.35	8.8
Coolidge	68	−2	31.2	0.37	6.0
Cottonwood Falls	64	6	36.4	1.83	2.9
Cunningham	65	4	38.6	1.65	2.8
Dresden	65	−2	30.8	1.26	10.0
Eldorado	64	13	38.4	1.65	T.
Ellinwood	67	−3	33.4	2.20	8.2
Ellsworth	65	−5	34.4	1.44	4.0
Emporia	62	10	36.0	1.06	1.0
Enterprise	64	−1	35.0	1.74	3.0
Eskridge	59	11	34.8	0.96	5.8
Eureka				1.88	3.0
Fall River	66	17	39.2	2.60	1.0
Farnsworth	67[a]	−1	30.8[b]	1.63	16.9
Fort Scott	69	17	38.2	1.73	5.0
Frankfort	58	1	33.0	0.83	3.5
Garden City	71	5	32.6	2.00	18.5
Garnett	61	18	36.2	0.68	T.
Goodland	64	3	30.1	1.41	11.0
Gove*[1]	65	3	31.2	1.20	12.0
Greensburg	69	8	35.0	1.29	6.5
Grenola	64	17	37.6	2.32	T.
Hanover	58	1	32.9	1.05	2.6
Harrison	60	−12	29.2	0.64	6.4
Hays	67	−6	30.4	1.76	14.0
Horton	55	4	33.6	0.62	2.0
Howard				2.34	
Hoxie	65	−2	30.0	1.40	14.0
Hutchinson	67	−1	35.6	1.69	5.0
Independence	66	20	39.8	3.34	2.5
Jetmore	68	5	33.0	1.92	13.0
Jewell	57	−10	28.8	1.32	8.5
Kingman	57[k]	7[k]	35.6[k]		
La Crosse	67	−2	31.6	1.75	15.0
Lakin	66	9	32.2	1.40	17.0
Larned	67	−1	31.6	1.89	14.0
Lebanon	63	−5	30.8	0.61	4.5
Lebo	64	14	36.6	1.29	0.2
Liberal	73	7	38.3	0.87	4.0
Macksville	69	2	34.2	1.61	6.0
McPherson	61	2	34.6	1.76	5.0
Madison	64	11	37.6	1.59	0.3
Manhattan	64	2	33.9	1.11	5.2
Manhattan Agr. College	62	−1	34.2	1.12	5.0
Marion	60	8	34.8	1.20	3.0
Moran	67	19	38.1	1.39	4.2
Mount Hope				1.22	2.0
Newton	63	6	37.2	1.21	
Norton	64	−11	29.0	0.94	10.5
Norwich	66	8	38.0	2.27	3.0
Oberlin				1.90	15.5
Olathe	59	8	35.8	1.03	
Osage City	63	9	36.1	0.82	2.2
Oswego	68	19	39.6	3.12	5.2
Ottawa	67	8	36.4	0.64	4.0
Paola	65	9	36.2	1.32	2.0
Phillipsburg	64	−7	30.6	1.22	8.5
Plainville	64	−3	32.4	1.95	14.0
Pleasanton	65	15	36.7	1.60	5.5
Republic				0.82	5.0
Rome	67	14	38.9	2.52	2.0
Russell	67	−5	31.4	1.94	12.0
Salina	60	−3	34.0	1.76	4.0
Scott	69	3	30.4	1.46	14.5
Toronto	73	18	39.0	1.95	0.2
Ulysses	68[d]	3[e]	32.0[d]	1.40	14.0
Valley Falls	60	2	35.2	0.48	3.4
Wakeeney	66	−2	30.9	1.11	13.0
Wakeeney (near)				1.11	14.5
Wallace	67	0	31.2	0.29	5.2
Walnut	67	21	39.0	2.76	2.0
Wellington				2.27	
Winfield	64	17	37.9	2.91	T.
Yates Center	67	17	39.2	1.59	1.6
Kentucky.					
Alpha	66	26	43.8	2.85	2.0
Anchorage	67	12	36.5	3.09	1.4
Bardstown	65	13	37.8	2.75	0.5
Beattyville	67	12	36.0	2.97	2.0
Beaver Dam	66	14	38.0	3.33	0.4
Berea	67	10	38.2	3.74	0.3
Blandville	64	20	41.2	3.57	0.2
Bowling Green	69	17	40.6	3.00	T.
Burnside	68	13	39.6	2.82	T.
Cadiz	68	16	41.8	3.89	T.
Calhoun	65	16	41.2	3.85	0.7
Catlettsburg	69	14	39.1	2.30	T.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Kentucky—Cont'd.	°	°	°	Ins.	Ins.
Earlington	65	15	39.5	4.03	0.5
Edmonton	68	12	39.4	3.19	2.6
Eubank	64	13	37.1	3.04	1.6
Falmouth				2.75	0.5
Farmers	64	10	36.9	3.44	2.0
Frankfort	64	13	38.0	3.28	T.
Franklin	65	17	41.7	2.83	T.
Greensburg	68	11	38.0	3.04	T.
Hopkinsville	67	17	40.8	3.99	T.
Irvington	63	17	38.8	3.74	1.0
Leitchfield	63	15	39.0	3.29	1.5
Loretto	70	9	37.2	3.45	1.0
Lynnville	68	16	41.0	4.48	T.
Maysville	66	11	35.1	2.77	2.3
Middlesboro	64[g]	19[g]	41.6[g]	3.46	1.0
Mount Sterling	66	14	37.6	3.75	T.
Owensboro	67	19	38.8	3.83	1.8
Owenton	60	16	36.2	3.37	2.2
Paducah	65	22	41.5	3.88	1.0
Richmond	66	14	38.4	3.10	
St. John	63	14	36.7	2.98	1.8
Scott	62	10	36.0	2.58	2.8
Shelby City	66	8	36.6	2.76	2.0
Shelbyville	64	12	37.2	3.35	4.6
Taylorsville	64	12	37.4	3.40	1.2
West Liberty	66	16	37.2	3.39	
Williamsburg	70	12	38.9	1.30	T.
Williamstown	62	13	34.6	2.69	2.6
Louisiana.					
Abbeville	77	30	53.6	6.12	
Amite	77	25	51.8	5.48	
Baton Rouge	77	23	50.8	4.55	
Burnside	77	28	53.6	3.69	
Cameron	74	32	54.4	2.94	
Cheneyville				4.90	
Clinton	73	27	52.4	4.98	
Collinston	78	26	49.4	3.70	
Covington	74	29	50.4	6.62	
Donaldsonville	77	31	55.2	5.50	
Farmerville	83	26	52.8	4.06	
Ferriday	82	24	52.1	3.19	
Franklin	77	32	54.6	4.87	
Grand Cane	82	25	49.4	4.53	
Grand Coteau	79	29	55.0	4.28	
Houma	78	31	52.0	5.48	
Jennings	76	31	53.2	3.39	
La Fayette	77	29	52.6	4.54	
Lake Charles				3.60	
Lakeside	77	29	54.9	3.02	
Lawrence	78	31	54.5	8.59	
Libertyhill	84	23	51.0	3.49	
Melville	86	25	54.8	2.85	
Minden	82	21	48.4	4.55	
Monroe	85	25	51.8	3.49	
Newellton	81	27	51.1	3.90	
New Iberia	77	30	54.6	4.51	
Opelousas	81	28	53.6	3.29	
Plain Dealing	79	23	50.4	4.04	
Rayne	76	29	54.0	4.58	
Reserve				7.05	
Robeline	81	19	47.4	1.34	
Ruston	87	26	52.6	2.90	
St. Francisville	78	28	53.0	5.95	
Schriever	82	29	55.8	8.50	
Southern University				8.77	
Sugar Experiment Station	77	32	54.8	7.89	
Sugartown	77	29	53.0	2.83	
Tallulah	87	20	50.6	3.66	
Maine.					
Bar Harbor	55	10	30.8	5.75	9.5
Cornish	54	8	27.8	3.27	7.6
Danforth				3.06	6.0
Fairfield	56	7	27.0	2.68	4.0
Farmington	54	3	27.0	3.30	8.0
Gardiner	57	10	29.8	3.75	6.8
Houlton	60	0	24.4	2.00	15.0
Lewiston	54	6	29.2	3.58	7.7
Madison	53	4	26.1	4.35	6.0
Mayfield	49	5	26.2	5.42	13.0
Millinocket	62	−2	25.0	3.32	11.0
North Bridgton	59	6	29.2	3.67	6.5
Oquossoc				3.78	
Orono	55	−2	27.8	3.84	7.7
Patten	42	4	23.7	4.00	15.0
Rumford Falls	52	6	27.4	2.87	7.0
The Forks				2.02	11.0
Winslow	56	5	28.7	3.15	4.0
Maryland.					
Annapolis	64	21	37.6	5.08	T.
Bachmans Valley	60	13	34.0	4.83	8.0
Cambridge	67	22	40.6	3.56	T.
Cheltenham	66	16	37.9	3.78	1.5
Chestertown	62	19	38.4	4.83	5.0
Chewsville	61	2	33.8	4.14	8.0
Clear Spring	62	14	33.8	4.39	8.5
Coleman	64	19	39.5	5.50	4.0
College Park (Md. Ex. Sta.)	76	12	38.4	3.73	3.8
Cumberland				3.17	6.5

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Maryland—Cont'd.					
Darlington	64[e]	15[e]	35.2[e]	5.86	7.0
Deer Park	57	-6	29.6	4.29	22.5
Denton	65	18	39.8	3.65	0.5
Easton	66	20	40.2	3.45	T.
Fallston	65	15	36.4	6.19	7.0
Frederick	62	17	36.4	4.06	4.1
Frostburg				2.87	9.5
Granteville	55	-3	30.6	5.15	10.0
Great Falls	66	15	36.4	3.50	2.5
Harney				5.06	5.5
Jewell	65	19	39.1	4.26	0.5
Keedysville	64	13	35.5	3.97	3.5
Laurel	67	12	36.2	3.95	4.0
Monrovia	63	15	36.8	3.93	1.5
Mount St. Marys College	58	15	35.4	5.19	12.0
Oakland	58	-7	30.1	3.84	12.2
Pocomoke City	66	22	42.2	4.88	1.5
Portobello				2.85	T.
Princess Anne	67	18	39.8	2.91	0.2
Salisbury	67	17	40.5	3.37	0.7
Solomons	65	22	40.0	2.04	T.
Sudlersville	64	19	39.2	4.23	2.4
Takoma Park	68	15	36.9	4.21	1.6
Taneytown	62	10	34.5	4.64	3.6
Van Bibber				5.13	
Western Port	62	12	34.8	2.18	6.5
Woodstock	64	16	39.0	4.36	2.0
Massachusetts.					
Amherst	60	10	31.2	3.89	7.5
Bedford	60	13	32.9	3.73	13.2
Bluehill (summit)	59	19	32.9	5.49	17.5
Chestnut Hill	62	12	34.8	6.25	8.2
Concord	61	9	31.8	4.23	12.0
Fall River	60	19	36.4	6.12	12.8
Fitchburg	60	16	32.8	3.63	11.0
Framingham	61	7	31.6	4.17	11.0
Groton	60	10	29.6	4.94	17.0
Hyannis	52	21	35.7	5.19	17.0
Jefferson				4.82	13.5
Leominster				3.72	10.8
Lowell	60	15	32.6	4.44	
Middleboro	59	11	34.1	5.75	9.8
Monson	58	11	31.6	4.83	13.0
New Bedford	56	20	37.5		
Princeton				4.02	11.2
Provincetown	55	24	36.2	4.72	9.5
Salem				4.36	0.8
Somerset	61	16	35.2	4.78	11.0
Sterling				4.01	11.5
Taunton	59	5	33.0	6.01	
Westboro	63	15	34.0	4.81	12.0
Williamstown	58	9	30.8	2.17	11.2
Winchendon				2.59	8.5
Worcester	59	16	33.4	4.16	11.5
Michigan.					
Adrian	60	10	30.5	3.40	8.0
Agricultural College	50	10	27.7	4.19	25.5
Allegan	52	15	30.6	2.30	21.5
Alma	48	10	28.0	3.70	18.5
Ann Arbor	52	11	29.0	2.91	10.1
Arbela	48	7	27.3	4.58	26.5
Ball Mountain	55	8	27.0	4.47	25.8
Baraga					3.5
Battle Creek	49	11	27.6	5.12	30.0
Bay City	48	11	27.7	4.32	25.0
Benzonia[a]	44	5	27.3		
Berlin	49	7	26.1	3.38	24.0
Big Rapids	48	7	27.2	3.20	13.0
Bloomingdale	54	7	30.5	4.80	17.0
Calumet	44	5	22.4	1.56	19.5
Cassopolis	52	15	27.6	5.07	32.0
Charlevoix	44	10	27.9	1.29	9.0
Charlotte	57	5	28.2		
Chatham	44	-9	21.8	1.38	12.6
Cheboygan	56	7	29.2	2.25	22.0
Clinton	54	9	29.0	4.37	14.0
Coldwater	60	8	30.3	4.82	23.5
Concord	55	10	29.2	3.62	23.0
Croton	50	10	29.8	2.02	10.5
Deer Park	41	5	25.0	1.41	12.0
Durand	51	12	28.2	3.20	18.5
East Tawas[a]	44	1	25.6		
Eloise	56	7	29.7	4.63	11.0
Ewen	49	-9	21.0	1.07	10.5
Flint	50	7	27.7	2.64	13.5
Frankfort	46	14	30.1	2.55	25.5
Gaylord	52	10	28.9	0.65	4.0
Grape	57	12	30.7	3.00	7.0
Grass Lake	52	9	27.8	2.83	20.0
Harbor Beach	48	5	27.2	1.87	14.5
Harrison	47	8	25.2	1.80	18.0
Harrisville	48	4	25.5	3.38	30.2
Hart	53	3	28.0		
Hayes	54[c]	5[c]	27.4[c]	3.43	20.0
Highland				3.66	22.1
Hillsdale	50	9	28.3	3.42	19.3
Holland	52	8	30.7	3.77	20.5
Howell	50[e]	8[e]	26.7[e]	2.11	15.5
Michigan—Cont'd.					
Humboldt	39	-18	17.0	0.40	4.0
Iron Mountain	49	-3	23.5	0.70	7.0
Iron River	47	-8	20.2	1.35	9.0
Ishpeming				1.35	13.5
Ivan	46	0	24.1	1.59	16.5
Jackson	52	13	30.1	3.53	17.0
Jeddo	49	2	27.0	2.72	20.2
Kalamazoo	50	15	29.0	4.37	30.0
Lake City	55	8	23.6	0.99	
Lansing	50	11	28.8	3.55	21.8
Lapeer	55	7	28.7	2.80	25.0
Ludington	46[e]	9[e]	31.4[e]	2.55	21.0
Mackinac Island	44	3	24.2	2.45	12.5
Mackinaw	43	6	26.6		
Mancelona	44	4	24.6		
Maple Ridge	45	-9	21.9	1.59	12.0
Menominee	43	8	25.4	2.35	17.0
Midland	46	11	28.9		
Montague	48	9	28.8	3.85	16.0
Morenci	56	9	30.8	5.06	9.8
Mount Clemens	48	10	26.2	2.31	8.5
Mount Pleasant	48	6	25.0	2.20	21.0
Muskegon	49	11	30.4	4.11	20.0
Old Mission	44	12	28.2	0.95	6.4
Olivet	50	11	28.2	4.38	27.6
Omer	45	-9	23.0	3.10	31.0
Onaway	49	2	24.6		
Petoskey	50	8	27.5	1.05	8.0
Plymouth	54	7	29.2	2.40	8.5
Port Austin	52	6	28.1	2.42	12.8
Powers	45	-5	21.8		
Reed City				1.20	10.5
Roscommon	47	2	22.8	1.80	13.0
Saginaw (W. S.)	50	12	28.6	3.21	14.8
St. Ignace	45	4	26.2	2.06	5.2
St. Joseph	53	13	31.7	4.66	20.0
Saranac	50	6	27.9	3.81	21.2
South Haven	49	9	29.0	4.93	10.0
Stanton[d]	49	18	28.6		
Thornville	60	7	30.8	3.66	30.0
Traverse City	45	10	29.0	1.62	13.0
Vassar				3.65	20.5
Wasepi	55	9	29.4	4.93	23.0
Webberville	55	11	28.2	3.30	24.5
Wetmore	42	-9	22.6	3.30	31.0
Woodlawn	43	-4	21.8	2.85	24.5
Ypsilanti	54	10	29.2	5.09	12.3
Minnesota.					
Albert Lea	47	2	24.8	1.55	9.0
Alexandria	47	-11	19.8	0.32	4.0
Angus	48	-22	17.9	0.28	
Bagley	45	-27	18.4	0.72	7.4
Beardsley	55	-5	20.7	0.35	1.5
Beaulieu	46	-15	20.5	0.70	8.5
Bird Island	46	-4	20.8	0.52	5.2
Blackduck	43	-15	16.2	0.40	0.2
Caledonia	42	4	24.0	1.02	6.5
Cass Lake				0.19	4.5
Collegeville	50	-5	23.7	0.36	4.8
Crookston	45	-15	18.0	0.40	4.0
Detroit	42	-24	16.0	0.35	6.0
Fairmount	49	4	27.0	1.50	7.0
Faribault	47	-21	24.6	0.28	7.0
Farmington	44	-6	23.6	0.95	9.0
Fergus Falls	48	-12	22.6	0.67	6.7
Floodwood	47	-2	20.2		
Fort Ripley				0.37	
Glencoe	48	-8	24.2	0.80	8.0
Grand Meadow	47	2	24.5	1.39	12.0
Hallock	44	-22	16.8	0.10	1.0
Halstad	48	-34	17.4	0.10	1.0
Hinckley	50	-15	20.2	0.44	7.8
Lake Crystal	50	0	25.8	0.63	5.7
Leech Lake	43	-18	17.2	0.53	6.8
Litchfield	49	-10	22.0	0.47	
Little Falls	50	-11	20.5	0.35	3.5
Long Prairie	48	-15	19.6	0.41	3.2
Luverne	55	-3	24.3	0.67	6.2
Lynd	50	-4	23.4	0.77	5.0
Mapleplain	46	-8	22.8	0.81	9.1
Milaca	51	-14	20.2	0.45	4.5
Milan	48	-11	20.0	0.57	5.8
Minneapolis[a,1]	46	-6	23.2	0.57	6.9
Montevideo	50	-5	22.9	0.63	4.0
Mora	51	-15	19.7	0.34	4.8
Morris	47	-9	20.9	0.32	4.0
Mount Iron	45	-18	16.3	0.55	5.5
New London	50	-12	21.0	0.64	6.4
New Richland	45	1	24.8	0.76	6.2
New Ulm				0.58	5.8
Osakis[e]	47	-10	20.2	0.17	1.7
Park Rapids	44	-16	17.4	0.85	8.5
Pine River	44	-19	16.4	0.43	9.0
Pipestone	42	-6	20.4	0.45	4.6
Pokegama Falls	43	-19	17.6	0.57	7.1
Redwing				0.80	8.0
Redwood Falls	46	-2	24.8	0.70	7.0
Reeds				0.17	4.1
Minnesota—Cont'd.					
St. Charles	45	2	25.6	0.55	
St. Cloud	53	-10	22.6	0.26	5.8
St. Peter				0.62	3.0
Sandy Lake Dam	48	-14	20.7	0.59	6.1
Shakopee	45	-5	23.6	0.55	5.5
Stephens Mines	48	-17	16.2	0.12	2.7
Taylors Falls	45	-25	18.0		
Tonka Bay				0.45	
Two Harbors	42	1	21.8	0.40	3.0
Wabasha	47	1	26.4	0.58	3.8
Walker	44[d]	-14[d]	18.8[d]	0.37	3.7
Willow River				0.40	7.5
Windom	56	0	25.6	0.38	
Winnebago	51	1	25.3	0.97	6.0
Winnebigoshish	45	-16	19.0	0.58	6.4
Winona	44	7	24.8	0.74	8.8
Worthington	56	1	23.4		
Zumbrota				0.15	
Mississippi.					
Aberdeen	70	19	46.0	4.37	
Agricultural College	70	21	46.7	2.83	
Anguilla	77	19	47.6	2.81	
Batesville	78	18	46.8	3.98	
Bay St. Louis	78	31	52.2	10.80	
Biloxi	77	30	53.0	9.61	
Booneville	70	20	44.0	5.57	
Brookhaven	75	24	49.9	5.02	
Clarksdale	74	22	47.3	2.55	
Columbus	70	19	45.2	3.06	
Corinth	68	21	43.7	5.67	
Crystal Springs	73	22	48.7	3.58	
Duck Hill	70	17	45.6	5.07	
Edinburg	71	19	46.9	3.84	
Edwards	76	22	51.2	3.60	
Fayette	76	20	50.2	4.64	
Fayette (near)				2.71	
Greenville	82	22	47.4	4.79	
Greenwood	76	21	46.6	3.64	
Hattiesburg	78	25	49.2	5.30	
Hazlehurst	72	23	48.4	4.10	
Hernando	75	20	45.8	3.67	
Holly Springs	70	20	42.3	4.59	
Jackson	72	22	48.6	3.64	
Kosciusko	71	21	46.8	3.35	
Lake	73	18	46.2	3.02	
Lake Como	73	21	50.0	4.09	
Leakesville	75	28	50.8	8.25	
Louisville	71	20	47.2	3.16	
McNeill	74	27	53.0	6.65	
Macon	72	21	44.8	4.09	
Magnolia	75	25	52.4	7.85	
Monticello	74	20	49.7	2.89	
Natchez	78	25	50.6	3.71	
Okolona	70	20	43.8	3.34	
Pearlington	76	28	51.6	7.49	
Pecan	77	28	52.9	7.44	
Pittsboro	76	18	43.5	4.67	
Pontotoc	70	20	45.2	2.68	
Porterville				4.66	T.
Port Gibson	77	22	49.0	2.96	
Ripley	75	22	44.6	7.46	
Rosedale	80	24	46.8	3.85	
Shoccoe	72	23	48.6	4.04	
Suffolk	73	24	51.1	3.82	
Swan Lake				5.81	
Tchula	70	20	46.6	3.68	T.
Tupelo	72	19	44.0	4.09	
University	75	19	45.6	5.29	T.
Utica	74	23	51.2	5.01	
Water Valley	73	19	46.8	6.75	
Waynesboro	72	22	48.2	6.10	
Woodville	72	24	51.0	4.00	
Yazoo City	76	22	48.0	3.76	
Missouri.					
Appleton City	68	13	37.8	1.13	5.0
Arthur	71	14	40.2	2.53	5.0
Avalon	58	9	35.0	1.68	5.0
Belle	74	12	38.4	2.14	7.5
Bethany	56	10	34.2	0.92	2.0
Birch Tree	69[e]	16[e]	37.4[e]	1.66	0.5
Bolivar	69	17	39.2	2.81	7.5
Brunswick	61	13	34.0	1.63	5.5
Caruthersville	66	16	43.0	2.91	T.
Clinton	67	14	39.1	1.71	6.5
Conception	57	6	31.9	0.14	1.0
Darksville	66	9	34.8	0.97	7.7
Dean	72[e]	21[f]	43.5[e]		
De Soto[a]	71	12	39.5		
Doniphan	67	15	40.0		
Eldorado Springs	67	12	40.0	1.14	2.3
Fairport				1.26	2.2
Farmington	68	16	37.6	2.79	0.5
Fayette	62	10	33.0	1.28	5.0
Fulton	68	15	37.6	1.18	7.5
Gano	75	17	39.1	1.29	4.7
Goodland	70	11	38.0	2.19	5.5
Gorin				1.61	2.8
Grant City	54	6	32.9	1.50	2.0

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Harrisonville	64	10	35.2	1.58	2.3
Hazlehurst	.....	.....	.....	0.95	2.0
Houston	70	14	39.0	1.36	7.0
Huntsville	.....	.....	.....	1.60	.....
Ironton	70	11	37.4	2.10	3.0
Jackson	66	18	40.8	2.73	1.0
Jefferson City	70	14	35.2	1.17	7.0
Joplin	68[d]	24[d]	42.6[d]		
Kidder	60	9	34.3	0.72	3.5
Koshkonong	69	19	40.4	1.83	2.0
Lamar	69	21	40.2	1.76	6.5
Lamonte	.....	.....	.....	0.99	3.0
Lebanon	70	18	37.8	1.83	10.5
Lexington	62	12	35.8	1.34	5.0
Liberty	58	7	35.2	1.43	4.2
Lockwood	70	21	40.0	1.72	8.5
Louisiana	68	12	36.4	1.68	5.5
Marble Hill	72	14	38.5	2.89	1.0
Marshall	63	16	35.6	1.54	5.0
Maryville	52	8	30.6	0.66	1.8
Mountain Grove	69	16	38.0	1.51	6.0
Mount Vernon	75	15	40.8	1.24	5.1
Neosho	71	17	40.7	2.21	3.5
New Palestine	65	15	39.0	0.78	5.8
Oakfield	72	17	38.5	1.76	7.1
Olden	72	8	39.6	1.72	2.5
Oregon	53	3	32.2	0.58	2.0
Perryville	62	20	38.4	3.72	4.0
Rolla	70	17	38.3	1.81	6.4
St. Charles	72	16	39.0	1.55	5.0
Sikeston	65	21	40.7	3.31	1.0
Steffenville	62	15	34.6	0.85	4.0
Sublett[a]	61	5	32.9	.....	
Trenton	56	11	34.0	0.46	1.5
Unionville	60	9	31.0	1.35	2.5
Versailles[b]	63	10	36.4	.....	.....
Warrensburg	64	12	37.8	1.44	12.5
Warrenton	67	17	35.4	1.97	5.2
Wheatland	.....	.....	.....	4.52	10.0
Willow Springs	76	10	38.9	2.49	4.5
Windsor	66	8	38.6	.....	.....
Montana.					
Adel	60	0	30.4	0.50	5.0
Anaconda	53	— 8	26.8	0.40	.....
Augusta	63	— 8	30.8	0.10	1.0
Babb	60[c]	8[c]	28.0[c]	0.61	4.0
Billings	66	2	32.2	0.43	2.4
Bowen	39	—36	10.6	2.56	25.6
Bozeman	52	— 5	25.8	0.42	6.7
Broadview	60	— 3	28.3	0.03	0.3
Busby	65	—15	35.6	0.39	0.9
Butte	52	— 4	26.4	0.24	2.4
Canyon Ferry	52	0	27.5	0.26	1.5
Cascade	59	— 6	35.4	0.27	3.5
Chester	58	—18	21.9	0.05	0.5
Chinook	52	—12	22.4	0.10	1.0
Columbia Falls	43	— 1	26.7	0.92	7.7
Copper	.....	.....	.....	0.21	4.5
Crow Agency	61	— 5	27.6	0.80	6.0
Dayton	45	11	28.6	0.87	.....
Decker	60	—16	27.4	T.	T.
Dillon	51	0	27.5	0.31	3.1
Ekalaka	65	— 6	27.4	0.25	2.5
Ericson	.....	.....	.....	0.13	T.
Fallon	57	—15	22.3	0.05	.....
Fort Benton	52	5	29.3	0.00	
Fort Harrison	52	— 3	26.4	.....	.....
Fort Shaw	60	0	33.6	0.06	1.3
Fortine	42	—10	25.0	0.91	11.5
Forsyth	53[e]	— 8[e]	25.7[e]	0.28	1.0
Glasgow	55	—20	20.0	0.30	2.0
Glendive	58	—15	23.4	0.46	5.0
Graham	59	— 1	27.5	0.24	0.6
Grayling	38[b]	—40[d]	13.4[e]	0.88	13.0
Great Falls	60	5	35.1	0.52	5.2
Hamilton	50[d]	—10[d]	28.9[d]	0.99	0.3
Highwood	.....	.....	.....	0.45	9.2
Home Park	.....	.....	.....	3.00	30.0
Jordan	59	—13	26.0	0.10	
Lewistown	71[c]	— 3[c]	29.3[c]	0.25	2.5
Livingston	59[g]	2[g]	35.2[g]	0.19	1.5
Lodge Grass	59	0	29.3	0.30	3.0
Lubec	60	— 9	27.6	1.35	13.5
Missoula	47[i]	— 4[h]	25.0[h]	0.31	3.0
Moore	.....	.....	.....	0.17	1.8
Norris	62	2	31.6	0.13	T.
Nye	.....	.....	.....	0.20	5.0
Ovando	48	—22	21.4	1.23	17.0
Philipsburg	56	—14	24.6	0.17	1.9
Plains	43	6	28.3	0.30	3.0
Pleasant Valley	43	— 9	23.4	0.14	1.3
Polson[k]	56	11	31.1	.....	.....
Poplar	55	—16	21.4	0.12	1.2
Raymond	60	20	37.2	0.02	0.2
Red Lodge	64	— 8	26.2	0.29	4.5
Renovo	54	3	30.0	0.05	0.3
Ridge Lawn	55	— 5	22.4	0.16	1.6
Saltese	.....	.....	.....	4.75	44.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Springbrook	60	— 9[m]	26.6[f]	0.64	6.4
Steel	66	— 3	33.6	0.15	1.5
Tokna	56	— 9	22.0	0.30	3.0
Tosten	46	—10	25.4	0.65	T.
Utica	62	0	31.6	T.	T.
Valentine	59	—14	24.8	0.30	3.0
Nebraska.					
Ainsworth	70	4	30.9	1.41	7.3
Albion	.....	.....	.....	1.20	12.0
Alliance	60	— 9	28.6	0.40	4.0
Alma	63	—16	28.6	0.76	7.5
Anoka	66	0	28.0	0.50	4.8
Arcadia	.....	.....	.....	0.80	8.0
Ashland	53	5	31.6	0.21	1.2
Ashton	.....	.....	.....	0.30	.....
Atkinson	69	1	29.0	0.62	4.0
Auburn	54	5	32.2	1.96	1.8
Aurora	.....	.....	.....	0.32	3.0
Beatrice	52	1	31.6	1.00	5.0
Beaver	62	— 8	29.6	0.93	8.5
Bellevue	52	5	31.2	0.26	2.0
Benkleman	.....	.....	.....	0.10	1.0
Blair	49	5	30.4	0.78	3.8
Blue Hill	.....	.....	.....	0.50	5.0
Bradshaw	.....	.....	.....	0.58	5.8
Bridgeport	61	—14	28.4	0.25	2.5
Broken Bow	70	— 3	29.6	0.64	5.2
Burchard	.....	.....	.....	1.17	1.8
Burwell	.....	.....	.....	0.60	6.0
Callaway	73	— 2	31.7	0.38	4.0
Cambridge	64	—13	27.7	1.10	20.0
Central City	.....	.....	.....	0.55	5.5
Columbus	53	4	28.7	0.35	2.0
Crete	52	1	31.0	0.49	.....
Culbertson	60	—11	28.2	0.71	.....
Curtis	59	—13	25.6		
David City	53	4	31.8	0.67	3.0
Dawson	56	4	33.0	1.47	2.0
Du Bois	.....	.....	.....	2.14	4.5
Duff	.....	.....	.....	0.60	6.0
Dunning	.....	.....	.....	0.20	2.0
Edgar	.....	.....	.....	0.50	5.0
Ellis	.....	.....	.....	0.30	3.0
Ericson	.....	.....	.....	0.90	9.0
Ewing	62	— 4	25.6	0.80	8.0
Fairbury	59	— 3	31.4	0.90	4.8
Fairmont	69	1	29.0	0.35	3.0
Fort Robinson	65	—12	26.8	0.54	5.4
Franklin	63[c]	—10[c]	28.6[c]	0.60	6.0
Fremont	51	6	30.1	0.48	3.0
Fullerton	57	— 1	28.6	0.61	7.2
Geneva	58	— 2	30.8	0.45	4.5
Genoa (near)	55	2	27.4	0.23	5.0
Gering	.....	.....	.....	0.34	3.8
Gosper	.....	.....	.....	1.00	9.5
Gothenburg	66	— 8	31.0	1.00	10.0
Grand Island	58	0	29.0	0.13	1.3
Grant	70	—10	28.8	0.70	4.0
Greeley	60	— 3	27.4	0.97	9.7
Guide Rock	.....	.....	.....	0.88	8.2
Haigler	.....	.....	.....	1.25	11.0
Halsey	66	2	31.7	1.78	.....
Hartington	54	— 2	27.4	1.10	11.0
Harvard	49	— 4	27.2	0.45	4.2
Hastings	60	— 3	28.8	1.15	10.2
Hayes Center	74	1	31.0	1.15	10.0
Hay Springs	65	—16	26.6	0.45	4.5
Hebron	58	— 2	30.4	0.40	3.5
Hendley	.....	.....	.....	1.00	8.0
Holdrege	64	— 3	31.0	0.70	7.5
Hooper*[1]	48	6	29.5	0.37	3.0
Imperial	71	—11	30.6	0.28	5.0
Kearney	67	— 8	29.8	0.48	4.2
Kimball	64	— 5	31.4	0.40	4.0
Kirkwood	69	2	30.6	0.50	5.0
Leavitt	56	4	29.9	0.24	1.2
Lexington	67	— 6	28.6	0.60	8.5
Lodgepole	64	—10	26.9	0.65	6.5
Loup	65	— 4	27.4	0.63	8.0
Lynch	62	0	28.8	0.66	5.0
McCook	.....	.....	.....	1.50	15.0
McCool	.....	.....	.....	0.28	3.0
Marquette	.....	.....	.....	0.50	5.0
Mason City	.....	.....	.....	1.16	12.5
Minden	62	— 7	28.6	0.73	6.5
Monroe	.....	.....	.....	0.32	4.0
Nebraska City	55	7	32.1	2.12	2.0
Norfolk	53	2	28.6	0.59	4.5
North Loup	68	— 5	28.4	0.68	6.8
Oakdale	53	— 2	26.2	0.97	7.5
Oakland	58	2	29.5	0.60	8.0
Odell	.....	.....	.....	0.90	3.5
Ord	.....	.....	.....	0.60	.....
Osceola	51[g]	5[g]	30.2[g]	0.77	7.8
Palmer	.....	.....	.....	0.40	4.0
Palmyra*[1]	60	6	31.9	0.70	1.5
Pawnee City	55	2	32.4	1.50	2.0
Plymouth	56	0	30.7	0.44	3.4

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Purdum	67	0	30.3	1.10	.....
Ravenna	63	— 4	29.2	0.75	6.0
Redcloud	62	—17	29.2	0.72	6.5
Republican	.....	.....	.....	0.65	6.5
St. Libory	.....	.....	.....	0.65	5.8
St. Paul	62	— 2	30.2	0.52	4.0
Santee	.....	.....	.....	0.82	6.7
Schuyler	.....	.....	.....	0.46	4.6
Scottsbluff	63	—21	27.4	0.23	2.5
Seward	55	1	29.8	0.35	2.0
Springview	62	3	29.3	0.40	4.0
Stanton	48	3	28.4	0.60	5.0
Strang	.....	.....	.....	0.60	6.0
Stratton	.....	.....	.....	0.60	6.0
Superior	60	— 7	28.4	0.35	2.0
Syracuse	.....	.....	.....	0.70	2.0
Table Rock	.....	.....	.....	1.89	3.0
Tecumseh	55	3	31.8	2.01	2.0
Tekamah	52	— 3	29.4	0.81	6.0
Turlington	53	6	30.9	1.28	3.5
University Farm	53	4	31.6	0.14	1.0
Wahoo	.....	.....	.....	0.30	4.5
Wakefield	48	1	28.0	1.11	10.3
Watertown	.....	.....	.....	0.39	3.1
Wauneta	.....	.....	.....	0.60	6.0
Weeping Water	55	4	30.4	0.70	3.0
Westpoint	55	2	29.4	0.30	3.0
Wilber	.....	.....	.....	0.20	2.0
Wilsonville	.....	.....	.....	1.10	11.0
Winnebago	50	0	28.3	1.36	6.0
Wisner	.....	.....	.....	0.41	7.8
Wymore	.....	.....	.....	0.92	0.6
York	58	0	30.4	0.41	4.0
Nevada.					
Austin	63	10	33.2	2.62	26.2
Battle Mountain	46	18	32.0	2.05	0.5
Beowawe*[5]	56	20	38.2	.....	.....
Carlin*[6]	65	2	34.2	.....	.....
Carson Dam	64	12	36.8	0.25	T.
Clover Valley	62	1	30.0	4.49	12.5
Columbia	63	15	36.8	0.20	2.0
Elko (near)*[1]	55	20	38.7	.....	.....
Eureka	59	4	32.8	2.45	24.5
Fallon	72	15	37.7	0.48	0.6
Fenelon	.....	.....	.....	1.70	10.5
Fernley	59	15	38.1	0.67	T.
Geyser	.....	.....	.....	0.70	7.0
Golconda	55	16	36.3	3.95	7.0
Halleck*[5]	68	7	30.7	3.46	17.1
Hamilton	.....	.....	.....	1.90	19.0
Humboldt*[1]	55	18	32.2	.....	.....
Jean	78	40	57.0	0.00	
Las Vegas	73	21	46.6	0.00	
Leetville	64	14	36.6	0.71	T.
Lewers Ranch	59	14	36.3	6.83	6.0
Logan	71	24	46.4	T.	
McAfees Ranch	66	— 3	29.2	2.00	T.
Millett	57	2	31.1	0.75	7.5
Mill City*[1]	56	17	34.5	2.05	8.0
Mina	56	20	37.6	0.00	
Palmetto	62	3	33.2	0.60	3.0
Paradise	.....	.....	.....	2.75	5.0
Potts	52	—11	28.1	0.53	10.5
San Jacinto	53	— 5	28.0	1.77	15.2
Soda Lake	65	16	37.5	0.61	
Squaw Valley	64[k]	— 2[g]	27.8[l]	1.64	8.0
Tecoma	50	— 1	26.8	0.30	3.0
Verdi*[1]	65	8	31.9	.....	.....
Wabuska	60	9	34.9	0.75	
New Hampshire.					
Alstead	55	7	26.9	3.38	10.0
Bethlehem	53	— 2	25.8	2.85	3.0
Brookline	56	0	32.0	2.54	11.0
Durham	62	16	32.2	3.59	10.0
Franklin Falls	55	2	28.8	3.31	8.0
Grafton	52	— 3	24.8	3.06	5.0
Hanover	54	0	26.9	3.28	5.9
Keene	56	3	28.6	3.47	10.0
Nashua	63	10	30.5	4.26	13.2
Newton	62	9	30.8	3.76	11.0
Plymouth	58	0	27.8	3.88	5.2
New Jersey.					
Asbury Park	65	18	38.2	5.31	4.5
Bayonne	59	18	36.4	4.34	6.0
Belvidere	58	14	34.2	4.74	7.7
Bergen Point	59	19	36.6	4.80	5.5
Beverly	62	16	36.8	4.58	5.7
Bridgeton	65	19	38.8	4.08	2.5
Browns Mills	65	10	36.0	5.84	6.7
Burlington	.....	.....	.....	4.47	5.5
Canton	.....	.....	.....	3.75	3.0
Cape May C. H	64[g]	22[g]	41.0[g]	4.96	
Charlotteburg	56	13	33.0	5.74	9.0
Clayton	64	18	37.2	5.59	4.5
Culvers Lake	.....	.....	.....	5.79	9.9
College Farm	59	13	35.2	2.47	3.8
Dover	55	13	31.9	6.40	10.5
Egg Harbor City	66	20	.....	5.47	2.5

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Jersey—Cont'd.	°	°	°	*Ins.*	*Ins.*
Elizabeth	58	18	36.6	5.16	8.5
Englewood	57	17	35.8	4.20	5.0
Flemington	58	16	35.2	4.79	8.5
Friesburg	65	18	38.0	4.25	5.5
Hightstown	59	17	36.6	3.84	5.0
Imlaystown	61	17	36.6	4.04	5.0
Indian Mills	61	16	37.5	4.71	6.0
Jersey City	56	18	37.1	4.43	6.2
Lambertville	59	17	36.0	4.64	7.0
Layton	56	3	31.0	4.73	8.5
Long Branch	61	18	38.0	5.34	6.0
Moorestown	62	17	37.2	4.25	6.0
Newark	57	16	36.4	4.87	7.9
New Brunswick	59	11	35.4	5.00	10.0
Oceanic	62	20	37.8	4.80	5.0
Paterson	58	17	36.4	5.51	7.1
Phillipsburg	58	16	34.5	4.42	9.1
Plainfield	58	15	35.0	4.45	5.8
Pleasantville	.....	.....	.....	6.22	0.1
Rancocas	.....	.....	.....	3.94	6.5
Somerville	59	15	35.1	4.75	5.0
South Orange	57	17	35.4	4.77	7.0
Sussex	57	13	33.2	3.55	9.5
Toms River	70	17	36.5	6.20	3.5
Trenton	61	18	39.2	4.81	4.2
Tuckerton	64	17	38.1	6.65	1.5
Vineland	65	18	37.7	4.29	3.5
Woodbine	62	17	38.3	5.29	T.
New Mexico.					
Alamogordo	67	17	44.2	T.	T.
Albert	77	10	41.1	0.20	2.0
Bell Ranch'	68	7	37.6	0.60	6.0
Bloomfield	60	11	32.2	0.43	1.5
Carlsbad	73	20	46.3	0.05	
Chama	55	−7	25.4	2.40	24.0
Cimarron	64	2	34.1	T.	T.
Cliff	66	14	41.3	....	
Cloud Croft	49	3	29.7	0.21	3.0
Datil	65	8	35.4	0.00	
Deming	78	23	50.7	....	
Dorsey	63[f]	3	33.6[e]	0.03	1.0
Dulce	60	−16	24.4	0.95	9.0
Eagle Rock Ranch	58	−1	30.9	1.07	15.5
Elizabethtown	50	1	24.2	0.40	4.0
Elk	68	14	41.2	T.	T.
Espanola	57	8	31.5	T.	T.
Fort Bayard	65	19	40.8	0.00	
Fort Stanton	67	7	38.7	0.02	0.3
Fort Union	61	−2	33.2	T.	T.
Fort Wingate	58	8	34.2	0.98	7.0
Frisco	.....	.....	.....	0.68	
Fruitland	54	8	31.9	0.44	3.8
Gage	67	20	43.2	0.00	
Glen	70	12	41.6	0.69	6.0
Hillsboro	65	18	42.7	0.00	
Laguna	67	9	35.0	0.00	
Lagunita	65	7	37.8	0.46	5.0
Lake Valley	.....	.....	.....	T	T.
Las Vegas	65	1	34.0	0.20	1.5
Logan	69	6	37.7	0.10	3.0
Lordsburg	70	20	46.4	0.00	
Los Alamos	.....	.....	.....	0.02	T.
Los Lunas	62	10	35.4	T.	
Luna	65	5	35.2	T.	
Magdalena	59	8	36.5	T.	T.
Manuelito	.....	.....	.....	0.52	5.5
Mesilla Park	70	21	46.1	0.00	
Mimbres	.....	.....	.....	0.00	
Mineral Hill	.....	.....	.....	0.38	3.0
Monument	72	20	45.8	0.00	
Mountain Air	56	12	35.8	0.34	6.0
Nursery Site	59	4	32.9	0.56	4.6
Orange	72	16	41.0	0.00	
Red Rock	.....	.....	.....	0.00	
Rincon	71	16	44.0	0.00	
Rociada	59	−4	33.3	0.12	
Rosedale	56	17	37.2	0.03	0.5
San Jon	73	7	40.3	1.15	8.0
San Marcial	64	18	39.4	0.00	
San Rafael	60	10	35.7	0.42	T.
Socorro	63	11	39.1	0.00	
Springer	62	0	33.5	0.00	
Strauss	.....	.....	.....	0.00	
Taos	55[e]	4[e]	29.4[e]	0.11	2.5
Trementina	.....	.....	.....	0.38	3.0
Tres Piedras	54	−9	24.3	1.10	13.0
Tucumcari	65[d]	11[d]	41.8[d]	0.80	8.0
Valley	.....	.....	.....	0.20	2.0
Vermejo	60	−4	32.1	T.	T.
Winsor	59[j]	−4[j]	26.6[j]	1.38	.....
New York.					
Adams	52	−8	31.0	7.31	47.0
Addison	58	2	32.3	2.38	11.5
Allegany	63	4	31.2	3.27	16.8
Amsterdam	45	1	27.2	3.78	11.0
Angelica	52	2	29.6	3.45	16.0
Appleton	53	17	31.7	3.58	8.0
Athens	55	4	31.6	4.68	10.0
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Auburn	53	11	31.4	2.13	17.0
Avon	55	11	30.6	2.90	10.5
Baldwinsville	56	6	32.4	3.83	17.0
Ballston Lake	53	−2	28.1	2.55	12.7
Bedford	58	5	29.6	4.33	9.2
Blue Mountain Lake	.....	.....	.....	5.17	15.0
Bouckville	52	3	26.9	3.10	14.0
Brockport	53	17	32.2	4.33	19.2
Cape Vincent	51	2	28.8	5.00	31.5
Carmel	56	10	31.8	5.26	12.0
Carvers Falls	52	6	28.0	4.56	7.0
Chatham	57	8	31.8	4.16	9.0
Chazy	49	−10	24.3	1.45	12.5
Cooperstown	50	0	28.6	4.19	14.0
Cortland	49	1	27.4	3.03	17.0
Cutchogue	56	20	36.4	6.07	12.0
Dannemora	46	2	26.5	3.78	22.0
De Ruyter	51	−4	28.5	4.07	19.9
Easton	.....	.....	.....	4.65	9.0
Elba	53	12	29.4	4.08	12.0
Elmira	56	8	32.6	3.06	18.0
Faust	50	−13	25.0	1.44	12.0
Fayetteville	55	0	32.0	2.69	13.5
Fort Plain	46	5	30.4	2.97	14.0
Franklinville	51	5	28.6	2.63	20.7
Glens Falls	53	10	29.9	5.18	10.3
Gloversville	45	−2	26.7	4.58	16.3
Greenfield	52	0	29.0	5.05	10.0
Greenwich	58[e]	7[e]	28.6[e]	2.12	7.0
Griffin Corners	53	−4	27.0	5.21	16.0
Harkness	50	−5	27.4	2.73	9.0
Haskinville	.....	.....	.....	2.59	8.9
Hemlock	53	10	31.8	3.03	2.5
Hunt	52	6	31.5	3.10	13.0
Indian Lake	45	−20	24.0	5.34	12.0
Ithaca	54	12	31.6	3.52	18.3
Jamestown	53	11	31.2	3.66	16.5
Jeffersonville	53	−7	27.4	4.10	15.5
Keene Valley	55	−9	27.3	4.26	10.3
Keepawa	48	−16	23.3	6.65	34.0
Keuka Park	56	12	31.9	2.87	17.9
Kings Ferry	.....	.....	.....	2.50	19.3
Lake George	53	8	29.4	5.31	12.2
Le Roy	53	12	30.6	3.69	18.9
Liberty	50	4	28.1	5.72	20.5
Little Falls City Res.	49	−2	28.4	3.17	20.0
Lockport	52	16	31.2	3.96	5.0
Lowville	52	−8	25.8	4.35	20.0
Lyndonville	.....	.....	.....	3.44	10.5
Middletown	56	15	33.4	3.36	12.0
Mohonk Lake	52	8	31.2	5.61	13.5
Moira	55	−4	26.0	5.87	34.5
Mount Hope	55	16	33.9	5.13	8.0
Newark Valley	.....	.....	.....	3.69	21.0
New Lisbon	50	−5	26.0	3.87	13.0
North Creek	48	2	27.5	6.59	14.2
North Lake	51	−13	24.0	4.93	13.0
Norwich	50	4	28.7	3.84	12.9
Ogdensburg	52	0	26.9	2.87	19.7
Oneonta	52	4	30.4	3.78	14.5
Otto	53	12	31.0	1.13	10.8
Oxford	47	0	28.0	5.03	24.2
Palermo	.....	.....	.....	5.05	26.8
Perry City	54	0	28.5	3.93	18.0
Philadelphia	50	−8	26.8	4.48	17.8
Plattsburg	50	−6	25.3	1.10	7.5
Port Jervis	57	8	31.6	4.81	7.0
Potsdam	54	1	24.4	3.27	14.7
Raquette Lake	46	−8	24.7	5.59	20.7
Romulus	55	14	32.2	2.32	17.8
Rose	53	14	32.2	3.25	6.5
Salisbury Mills	58	11	32.3	4.88	20.0
Scarsdale	54	12	33.6	2.77	7.0
Setauket	58	21	37.2	5.53	8.5
Shortsville	54	14	31.2	2.16	5.5
Skaneateles	.....	.....	.....	4.14	
Southampton	59	19	36.5	6.39	7.3
South Canisteo	54	6	30.8	2.87	13.6
Spier Falls	52	2	28.6	5.47	14.0
Taberg	52	−10	27.8	4.66	21.0
Ticonderoga	52	5	30.0	6.50	5.0
Trudeau	54	−9	25.8	3.13	13.2
Volusia	51	10	29.1	4.55	21.0
Wading River	58	10	35.0	5.29	12.1
Wappinger Falls	62	12	33.5	4.28	15.0
Warwick	.....	.....	.....	3.81	11.0
Watertown	55	0	29.6	5.54	22.0
Waverly	54	−2	30.1	3.69	17.3
Wedgwood	51	11	29.0	4.12	19.0
West Berne	55	0	29.5	2.27	12.0
Westfield	54[e]	8[e]	28.7[e]	3.80	15.5
West Point	55	11	34.0	3.90	6.0
Windham	55	−2	28.8	3.41	14.0
Youngstown	.....	.....	.....	4.58	18.5
North Carolina.					
Banners Elk	60	9	34.1	5.81	7.5
Beaufort	65	29	49.2	2.68	1.0
Brevard	60	6	36.9	7.98	0.8
North Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Brewers	66	18	40.7	5.38	T.
Caroleen	69	16	41.2	7.22	2.0
Chalybeate Springs	70	17	43.9	7.16	.....
Chapel Hill	68	21	43.8	7.06	4.0
Egletown	68	16	43.8	5.30	6.5
Edenton	67	22	44.7	3.63	4.0
Fayetteville	70	18	46.0	5.26	5.2
Greensboro	68	23	41.7	3.98	
Greenville	.....	.....	.....	3.41	3.0
Hendersonville	67	18	39.6	9.06	
Horse Cove	59	10	37.4	10.78	1.2
Hot Springs	72	15	42.0	2.23	1.0
Kinston	79	19	46.0	3.08	4.0
Lenoir	68[d]	15[d]	39.9[d]	4.90	T.
Lexington	65	16	40.9	5.52	2.0
Lincolnton	55	17	32.1		
Louisburg	66	18	42.5	7.12	1.5
Lumberton	71	19	45.0	5.07	3.0
Marion	67	19	40.9	7.78	1.5
Moncure	69	17	42.5	6.45	
Monroe	68	11	42.0	6.40	4.0
Morganton	66	14	39.6	8.01	1.0
Mount Airy	65	13	40.7	6.32	T.
Nashville	70	18	43.2	6.32	7.0
New Bern	74	21	46.8	3.20	2.0
Patterson	60	16	37.9	5.62	2.0
Pinehurst	69	22	45.4	6.06	1.0
Ramseur	67	15	39.8	6.82	2.0
Randleman	.....	.....	.....	5.08	2.0
Reidsville	66	17	40.8	5.11	2.0
Rockingham	71	18	46.8	5.80	3.0
Salem	65	15	40.0	5.06	
Salisbury	69	30	.....	6.18	4.0
Saxon	65	14	39.3	4.84	2.0
Scotland Neck	71	16	45.8	4.49	5.0
Selma	.....	.....	.....	5.65	
Settle	73	10	39.6	5.80	0.5
Snow Hill	72	20	45.6	3.31	1.8
Southern Pines	70	21	45.8	6.35	0.2
Southport	67	25	49.8	2.65	0.8
Tarboro	70	21	44.8	5.05	4.5
Vade Mecum	66	14	39.9	6.50	
Wash Woods	67	25	44.4	5.85	T.
Waynesville	66	11	38.2	3.74	1.5
Weldon	70	20	42.3	5.65	2.8
Willard	.....	.....	.....	3.30	0.3
North Dakota.					
Amenia	45	−15	18.4	0.37	3.7
Aplin	54	−6	24.4	0.35	3.5
Beach	58	−8	22.6	0.56	5.3
Bottineau	44	−18	17.2	0.05	
Buford	55	−13	22.0	0.30	3.0
Cando	47[e]	−20[e]	15.2[e]	0.25	2.5
Coal Harbor	52	−12	20.7	0.30	3.0
Crosby	49	−18	17.8	1.28	14.0
Dickinson	57	−7	23.6	0.22	2.0
Donnybrook	55	−21	20.2	0.25	2.5
Dunseith	41	−19	16.6	0.30	3.0
Edgeley	54	−3	24.9	T.	T.
Edmore	42	−20	16.8	0.70	7.0
Elbowoods	55	−12	22.8	0.30	3.1
Ellendale	.....	.....	.....	0.02	0.1
Flasher	57	−5	25.0	T.	T.
Forman	48	−4	23.6	0.48	4.8
Fort Yates	50	−4	24.2	0.06	0.4
Fullerton	49	−5	21.7	0.21	2.1
Gladys	52	−18	18.8	0.68	5.5
Goforth	58	−12	24.5	0.15	1.0
Granville	58	−17	19.2	0.18	4.0
Hannah[d]	38	−23	13.2	0.20	2.0
Hillsboro	46	−20	19.0	1.28	10.8
Jamestown	50	−8	22.6	0.70	7.0
Kulm	54	−4	23.4	0.32	2.7
Lakota	45	−26	16.4	0.37	5.0
Lisbon	55[d]	−10[d]	23.9[d]	0.12	1.2
McKinney	55	−23	17.0	0.70	7.0
Manfred	50	−14	18.8	0.57	6.5
Mayville	49	−24	17.7	0.23	1.0
Medora	58	1	26.2	0.25	2.5
Melville	42	−10	13.8	0.40	4.0
Minot	57	−17	20.2	0.36	3.5
Minto	48	−16	20.3	T.	T.
Mott	59	−6	22.6	0.23	.....
Napoleon	51	−8	21.1	0.15	1.5
New England	46[f]	−7	21.2[e]	0.10	1.0
New Salem	56	−5	23.4	0.28	2.0
Oakdale	68	−9	26.1	0.20	2.0
Page	49	−21	20.2	T.	T.
Park River	47	−19	18.9	0.15	1.5
Pembina	40	−20	10.2	0.20	2.0
Portal	54	−25	16.4	0.20	2.0
Power	50	−16	21.0	0.45	4.5
Pratt	60	−21	15.0	0.20	2.0
Steele	45[d]	−9[d]	20.2[d]	T.	T.
Towner	53	−20	18.0	0.10	1.0
University	46	−21	19.2	0.30	.....
Valley City	44	−11	22.1	0.33	3.2
Walhalla	50	−18	15.6	T.	T.

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
White Earth	53	−19	15.3	0.60	6.0
Willow City	50	−10	20.8	0.15	1.5
Wishek	.....	.....	.....	0.05	0.5
Ohio.					
Akron	56	12	31.8	2.28	3.0
Amesville	63	14	35.2	2.67	1.0
Bangorville	59	8	31.2	3.92	3.2
Bellefontaine	59	5	31.4	4.10	.....
Benton Ridge	58	12	32.9	3.77	3.4
Bladensburg	58	5	31.6	2.75	3.2
Bowling Green	59	10	32.2	4.13	4.5
Bucyrus	58	6	30.6	2.31	2.6
Cadiz	58	12	33.0	2.94	4.1
Cambridge	60	11	34.0	2.41	T.
Camp Dennison	61	8	35.8	2.33	1.9
Canal Dover	57	9	32.2	3.63	2.5
Cardington	56	6	32.2	3.64	7.2
Circleville	60	12	34.8	2.42	2.0
Clarington	62	12	35.0	3.60	1.0
Clarksville	62	9	34.8	3.45	4.1
Cleveland^{b}	57	15	33.4	2.99	8.7
Coalton	65	9	34.2	3.00	1.5
Dayton	61	13	34.3	3.08	2.4
Defiance	60	11	32.2	4.13	14.8
Delaware	57	7	33.0	2.66	3.4
Demos	60	12	33.9	2.67	2.7
Findlay	60	12	31.2	3.61	0.5
Frankfort	61	12	36.2	2.95	4.5
Fremont	59	11	32.6	2.83	6.3
Garrettsville	57	5	30.4	3.02	7.5
Granville	59	10	32.8	3.09	3.7
Gratiot	58	12	32.8	3.75	7.2
Green	65	12	37.0	4.31	1.0
Greenhill	58	4	30.6	2.32	5.6
Greenville	59	10	33.6	4.37	0.5
Hedges	59^{1}	2	30.2^{e}	5.55	4.0
Hillhouse	56	11	31.2	4.20	15.5
Hiram	56	13	30.5	2.69	10.0
Hudson	62	5	29.0	2.97	5.0
Ironton	64	12	37.4	2.46	.....
Jacksonburg	59	14	33.8	3.14	1.0
Kenton	58	9	32.2	3.23	T.
Lancaster	60	14	35.6	3.65	3.9
Lima	65	8	32.8	3.99	2.5
McConnelsville	62	14	34.8	2.35	2.7
Marietta	63	19	37.6	3.05	1.7
Marion	60	9	33.6	2.88	5.0
Medina	57	5	31.6	3.04	4.0
Milfordton	58	10	30.6	3.80	4.0
Milligan	62	9	34.0	3.50	7.5
Millport	56	4	31.2	2.19	4.2
Montpelier	55	15	31.7	4.89	12.5
Napoleon	60	13	32.7	3.58	3.8
Nellie	58	9	32.0	3.65	T.
New Alexandria	58	9	32.0	2.70	4.0
New Berlin	57	7	30.8	2.38	3.0
New Bremen	60	8	33.0	4.03	2.2
New Richmond	61	12	35.8	2.49	3.6
New Waterford	56	7	30.5	2.85	9.0
North Lewisburg	59	7	31.6	3.80	5.0
North Royalton	55	8	31.0	3.59	10.5
Norwalk	59	2	31.2	3.67	5.5
Oberlin	58	8	32.3	3.41	5.2
Ohio State University	58	12	34.2	2.51	2.8
Orangeville	63	7	31.6	2.36	2.5
Ottawa	69	7	32.8	4.29	3.5
Pataskala	59	12	33.0	2.93	6.2
Philo	61	15	34.2	2.41	1.5
Plattsburg	61	9	32.9	3.74	11.5
Pomeroy	58	16	35.2	1.10	1.0
Portsmouth	64	13	35.9	2.95	2.1
Rittman	57	6	31.0	3.14	4.1
Rockyridge	59	13	32.4	4.30	3.5
Rome	56	5	29.9	3.87	17.0
Shenandoah	57	10	31.0	3.17	4.2
Sidney	60	10	33.4	4.09	4.3
Somerset	59	12	33.9	1.61	5.3
South Lorain	59	7	32.8	3.58	7.5
Springfield	.....	.....	.....	3.27	2.2
Summerfield	61	9	33.8	2.85	2.0
Thurman	64	12	36.7	1.85	2.0
Tiffin	57	15	33.2	3.60	4.0
Toledo (St. Johns College)	58	16	32.6	3.98	7.2
Upper Sandusky	58	13	33.0	3.97	1.8
Urbana	62	6	32.8	2.71	3.5
Vickery	59	12	32.2	3.94	8.0
Warren	56	10	32.4	2.74	9.0
Wauseon	58	9	30.6	3.76	9.6
Waverly	65	10	36.0	2.76	3.8
Waynesville	62^{e}	11^{b}	32.8^{e}	2.07	.....
Wellington	56	11	32.8	3.04	4.0
Willoughby	.....	.....	.....	3.27	5.5
Wilson	63	7	35.0	2.70	4.0
Wooster	56	9	32.2	3.41	4.2
Oklahoma.					
Alva	76	18	41.0	1.88	0.5
Arapaho	71	13	42.8	1.61	
Buffalo	71	12	40.6	2.24	2.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Oklahoma—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cache	72	15	41.1	1.44	
Chandler	73	20	44.0	2.75	T.
Chattanooga	75	17	44.6	1.95	
Cloud Chief	70	17	43.3	1.82	
Dacoma	70	17	40.4	2.62	1.0
Eldorado	75	16	43.8	1.50	
Enid	67	19	40.8	1.94	0.2
Erick	71	13	41.8	1.12	
Fort Sill	73	21	45.0	2.40	
Gage	70	13	39.4	1.97	
Grand	67	11	41.6	1.92	
Guthrie	68	18	43.2	2.78	0.2
Harrington	72	12	40.3	1.47	T.
Helena	70^{b}	16^{b}	41.0^{b}	2.50	T.
Hennessey	67	20	43.6	2.68	0.2
Hobart	76	21	45.2	1.75	
Hooker	75	6	38.2	0.70	7.0
Jefferson	65	20	40.4	3.60	T.
Kenton	67	4	35.1	0.60	5.0
Kingfisher	68	20	42.7	2.26	T.
McComb	70	20	42.1	2.00	
Mangum	70	20	45.0	1.80	
Meeker	70	19	41.5	2.85	
Mutual	72	11	41.5	1.85	
Neola	70	22	42.7	1.57	
Newkirk	65	19	40.6	3.56	T.
Okeene	71	18	41.4	2.17	
Pawhuska	67	18	41.4	1.80	T.
Perry	69	16	41.4	3.59	0.5
Shawnee	74	21	41.0	2.47	
Snyder	72	22	44.4	1.54	
Stillwater	70	20	40.6	2.72	0.8
Temple	73	23	45.8	1.50	
Waukomis	68	17	40.8	3.00	T.
Weatherford	69	19	41.8	2.10	
Whiteagle	68	19	40.2	2.92	T.
Oregon.					
Alba	.....	.....	.....	2.51	
Albany	59	32	43.6	11.70	
Alpha	60	30	44.6	24.56	
Ashland	65	20	43.0	5.94	
Astoria	62	33	45.4	12.93	
Aurora (near)	59	30	42.8	7.71	
Bay City	77	32	50.9	14.55	
Bend	59	1	33.8	4.78	19.0
Black Butte	60	27	41.8	9.82	
Blalock	56	24	40.0	3.79	9.0
Buckhorn	62	29	42.4	20.48	T.
Bullrun	56	28	40.7	14.93	0.7
Burns	59	4	29.6	3.49	15.0
Cascade Locks	60	28	40.0	18.81	12.0
Coquille	.....	.....	.....	16.93	
Corvallis	60	31	43.3	13.33	
Crescent	.....	.....	.....	6.09	28.2
Dayville	61	20	38.1	2.49	3.7
Doraville	58	29	40.2	11.17	10.5
Drain	62	31	45.0	15.39	
Echo	63	14	38.6	0.94	3.0
Ella	60	14	36.9	1.60	3.5
Eugene	63	32	44.5	11.93	
Fairview	67	30	48.2	21.42	
Falls City	56	30	42.2	23.99	6.0
Forest Grove	57	28	41.8	12.06	2.0
Gardiner	62	33	47.6	18.12	
Glendale	56	22	38.6	9.00	
Glenora	58	28	41.1	28.71	1.0
Gold Beach	67	31	50.0	22.98	
Grants Pass	63	28	42.8	9.33	
Grass Valley	56	20	37.6	2.68	5.7
Heisler	63	15	37.5	3.25	3.5
Heppner	63	17	36.1	1.48	0.2
Hermiston	59	13	37.3	1.30	2.0
Hood River	50	25	37.0	8.60	16.0
Huntington	67	24	38.8	0.54	5.0
Jacksonville	59	26	41.0	9.58	T.
Joseph	55	3	29.8	2.67	12.0
Klamath Falls	52	11	34.6	3.85	12.0
La Grande	57	8	35.0	2.93	13.0
Lakeview	59	9	32.1	2.83	
Lost River	51	14	33.6	2.34	5.0
McKenzie Bridge	63	20	38.2	20.05	8.0
McMinnville	58	29	42.0	12.63	0.2
Marshfield	67	30	48.0	17.41	
Mikhalo	59	15	36.3	1.46	6.0
Monroe	58	32	42.9	17.26	
Mountain Park	54	24	35.0	17.20	30.5
Mount Angel	66	29	45.0	14.19	
Nehalem	.....	.....	.....	19.06	
Newport	66	32	49.2	13.73	
Ontario	.....	.....	.....	1.25	4.5
Orecco^{b}	56	22	35.6	.....	.....
Pendleton	62	20	37.9	0.94	2.0
Port Orford	61	38	49.4	25.32	
Prineville	56	18	35.2	3.38	T.
Richland	52	11	33.2	1.06	3.8
Riverside	58	6	31.8	2.70	9.5
Salem	57	32	44.0	8.92	
Silver Lake	55	8	33.6	2.10	5.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Oregon—Cont'd.	°	°	°	*Ins.*	*Ins.*
Stafford	57	29	43.0	9.68	
The Dalles	56	25	38.4	5.52	13.7
Toledo	65	32	46.0	14.05	
Umatilla	55	20	38.8	1.22	0.1
Vale	49	10	30.8	1.61	6.0
Van	.....	.....	.....	5.80	18.0
Wallowa	53	0	29.5	2.09	9.8
Warm Spring	61	11	37.4	4.33	7.0
Wasco				3.59	8.0
Weston	61	19	37.6	2.35	4.0
Yonna				3.20	10.5
Pennsylvania.					
Aleppo	63	10	33.8	3.25	3.0
Altoona	57	4	29.9	3.27	.....
Baldwin	53	10	29.7	3.35	15.6
Bellefonte	54	13	33.4	4.30	9.0
Browers Lock	.....	.....	.....	4.95	.....
California	65	16	37.2	3.81	3.6
Cassandra	55	4	31.1	3.85	13.5
Center Hall	55	9	35.0	3.23	8.2
Claysville	65	7	34.0	2.80	9.9
Coatsville	66	15	35.6	5.51	9.7
Confluence	.....	.....	.....	3.06	.....
Davis Island Dam	.....	.....	.....	3.29	.....
Derry	67	10	35.1	3.49	2.5
Doylestown	.....	.....	.....	4.77	
Drifton	53	9	31.4	6.70	14.0
Dushore	53	12	31.5	4.17	12.5
East Mauch Chunk	56	9	32.8	7.01	8.2
Easton	58	17	35.4	4.44	6.8
Ellwood Junction	.....	.....	.....	3.02	
Emporium	55	15	32.5	3.63	7.7
Ephrata	59	13	33.8	4.39	10.5
Everett	60	8	33.6	3.41	6.0
Forks of Neshaminy	.....	.....	.....	4.55	
George School	61	16	36.1	4.54	6.1
Gettysburg	61	10	33.8	5.82	9.5
Girardville	.....	.....	.....	7.89	23.5
Gordon	56	3	31.4	7.43	
Greenville	55	6	31.1	3.36	9.8
Grove City	59	10	31.1	3.08	10.1
Hamburg	57	13	32.6	7.39	
Hanover	62	12	37.0	4.65	8.5
Herrs Island Dam	.....	.....	.....	3.01	2.0
Huntingdon	56	10	32.4	3.95	9.0
Hyndman	61	6	34.5	3.46	5.0
Indiana	67	10	33.4	2.57	6.8
Irwin	68	9	38.1	3.43	4.3
Johnstown	58	9	33.4	4.11	7.2
Kennett Square	62	16	35.6	7.15	8.0
Lansdale	.....	.....	.....	4.07	
Lawrenceville	57	0	30.8	3.83	8.5
Lebanon	58	13	34.6	5.76	12.6
Le Roy	55	12	30.8	3.91	14.7
Lewisburg	54	9	31.0	5.72	13.0
Lock Haven	54	12	32.2	3.95	11.5
Lock No. 4	.....	.....	.....	2.82	
Lycippus	60	13	34.4	3.37	9.6
Marion	60	12	33.7	5.14	9.0
Mifflintown	59	8	32.6	5.11	13.5
Milford	55	5	30.4	6.85	13.1
Montrose	58	3	27.8	3.80	15.0
New Germantown	58	11	34.4	4.28	6.5
Ottsville	.....	.....	.....	5.15	
Philadelphia	62	21	39.8	5.26	6.0
Pocono Lake	52	−2	26.9	6.39	11.0
Point Pleasant	.....	.....	.....	4.60	.....
Pottsville	.....	.....	.....	7.17	.....
Reading	60	15	35.4	5.00	.....
Saegerstown	56	−8	31.4	3.94	15.5
St. Marys	67^{a}	9^{a}	32.1^{a}	2.84	12.2
Seisholtzville	.....	.....	.....	5.05	
Selinsgrove	54	12	32.3	6.77	12.5
Shawmont	.....	.....	.....	5.15	
Skidmore	58	5	31.0	1.90	8.0
Smiths Corners	.....	.....	.....	4.47	
Somerset	.....	.....	.....	4.42	19.7
South Eaton	52	6	32.1	5.28	12.0
Springmount	.....	.....	.....	4.16	
State College	55	7	31.6	3.47	10.2
Towanda	53	3	31.3	2.93	10.8
Uniontown	67	15	35.2	3.67	4.2
Warren	54	10	31.1	3.00	15.1
Wellsboro	58	5	31.6	2.93	10.0
West Chester	62	15	35.9	5.72	10.2
Wilkes-Barre	55	12	33.6	5.66	11.0
Williamsport	53	16	32.8	4.11	8.1
Rhode Island.					
Bristol	56	20	36.8	5.32	9.0
Kingston	55	14	34.0	7.99	13.0
Providence	.....	.....	.....	6.36	11.0
South Carolina.					
Aiken	73	21	47.3	5.18	
Allendale	70	27	48.7	3.70	
Anderson	67	15	42.8	6.58	0.8
Batesburg	66	20	45.1	5.46	T.
Beaufort	70	27	51.8	4.71	
Bennettsville	72	18	46.4	3.12	4.0

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Blackville	75	12	50.2	4.78	
Bowman	70	20	48.1	6.41	T.
Calhoun Falls				7.84	
Camden	67	22	45.5	5.98	1.0
Catawba				7.55	
Cheraw	69	20	44.2	4.41	1.0
Clarks Hill	68	17	44.9	6.74	2.5
Clemson College	65	16	42.0	7.45	1.0
Conway	74	21	48.8	4.72	T.
Darlington[f]	72	19	43.9		
Dillon	71	19	46.8	4.62	
Due West	66	21	45.2	6.05	T.
Edisto				5.75	
Florence	70	21	46.6	4.18	
Georgetown	75	27	51.0	3.93	
Greenville	66	21	41.3	6.82	0.2
Greenwood	64	22	41.9	7.35	
Heath Spring	67	25	44.2	7.13	
Kingstree	71	23	50.0	4.82	T.
Liberty	66	12	41.4	8.40	3.0
Little Mountain	68	23	46.0	4.30	0.5
Newberry	70	22	44.4	7.87	0.6
Pelzer				6.73	0.5
St. George	73	21	50.4	4.69	
St. Matthews	69	25	46.2	4.48	
Saluda	67	20	44.5	6.83	T.
Santuck	67	19	43.0	7.13	0.2
Smiths Mills				3.11	T.
Society Hill	68	22	45.1	3.78	2.0
Spartanburg	68	16	41.7	8.21	0.8
Statesburg	69	24	48.6	4.08	1.5
Summerville	74	21	49.9	6.60	
Trenton	66	22	45.0	8.24	
Trial	71	22	48.6	5.17	
Walhalla[k]	62	21	42.4		
Walterboro	75[e]	20[e]	50.1[e]	7.21	
Winnsboro	63	21	44.8	6.14	1.0
Winthrop College	69	18	44.1	7.03	1.0
Yemassee	71	22	49.2	7.74	
Yorkville	68	20	44.7	8.70	3.0
South Dakota.					
Aberdeen	56	− 7	22.5	0.74	5.0
Academy	62	2	30.1	0.71	7.5
Alexandria	55[f]	− 7[e]	26.4[f]	0.68	4.8
Armour	62	−13	27.4	0.69	6.0
Ashcroft	65	−10	25.0	0.20	2.0
Bowdle	59	− 2	25.8	0.25	2.5
Brookings	52	−11	23.1	1.12	10.5
Canton	56	− 8	25.6	0.71	8.0
Castlewood	50	−11	21.6	0.46	5.3
Centerville	56	− 3	27.0	1.28	12.7
Chamberlain	61	− 4	29.0	0.32	8.0
Cherry Creek	63	− 5	27.6	0.45	2.5
Clark	51	− 5	22.8	0.38	3.8
Clifton	58	−15	24.0	0.40	4.0
De Smet	53	− 2	25.4	0.45	3.0
Elkpoint	52	1	28.6	1.15	5.5
Faulkton	56	− 7	25.4	0.25	4.0
Flandreau	46	− 8	23.4	0.45	4.5
Forestburg	55	−13	24.6	0.60	4.0
Fort Meade	63	7	32.6	0.33	3.0
Frederick	54	− 6	23.8	0.26	1.9
Greenwood	67	− 3	31.4	0.66	6.4
Hermoso	73	3	31.5	0.34	2.0
Highmore	60	− 9	27.0	0.40	4.0
Howard	56	− 8	25.0	0.52	6.0
Howell	60	−13	24.0	0.29	3.3
Ipswich	53	−10	23.4	0.23	2.0
Kennebeck	60	− 4	27.4	0.45	3.5
Kidder	51	− 6	21.8	1.01	2.1
Kimball	61	4	29.1	0.28	2.0
La Delle	58	− 5	25.0	0.59	4.0
Marion	53	− 3	27.0	1.00	5.2
Mellette	58	−14	24.0	0.20	2.0
Menno	58	− 8	27.7	1.04	7.7
Mill Bank	54	− 4	21.8	1.01	8.0
Mitchell	56	− 6	27.4	0.20	1.5
Montrose	53	− 7	24.0	0.80	7.0
Mound City	51	− 4	24.4	T.	T.
Murdo				0.75	5.0
Oelrichs	63	− 1	26.8	0.80	6.0
Orman	60	− 4	28.8	0.44	4.5
Philip	71	0	30.5	0.55	5.0
Plankinton				0.64	5.4
Redfield	60	−11	24.0	0.20	2.5
Rosebud	66[d]	5[h]	31.1[h]	0.59	5.6
Roslyn	50	− 8	22.9	0.13	1.3
Selby[e]	49	1	26.6		
Sioux Falls	56	− 4	26.5	0.69	7.5
Spearfish	62	4	31.8	0.51	2.2
Stephan	60	− 7	26.2	0.33	6.0
Vermillion	57	0	29.2	0.95	8.0
Watertown	56	− 8	21.9	0.80	8.0
Wentworth	52	− 7	23.6	0.66	6.2
Wessington Springs	60	− 4	28.0	0.67	4.3
Woolsey				0.65	5.5
Tennessee.					
Ashwood	71	14	41.6	2.85	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Tennessee—Cont'd.	°	°	°	*Ins.*	*Ins.*
Benton	67	15	42.6	3.18	
Bolivar[l]	70	18	42.8		
Bristol	63	16	37.2	3.85	T.
Brownsville	67	22	44.9	3.90	
Byrdstown	69	15	42.4	3.64	1.0
Carthage				3.48	T.
Cedar Hill	68	17	41.8	3.15	T.
Clarksville	67	18	41.3	4.02	0.5
Covington	68	19	43.8	4.25	
Decatur	65	15	41.0	5.11	T.
Dickson	72	16	41.7	3.23	T.
Dover	69	14	41.4	4.22	T.
Dyersburg	67	20	43.0	3.36	T.
Elizabethton	69	16	40.3		1.0
Erasmus	68	5	37.6	4.03	0.2
Florence	70	18	42.1	2.78	0.2
Franklin	71	17	41.0	3.29	T.
Hails Hill				3.12	
Harriman	65	18	41.2	5.39	
Hohenwald	72	17	43.8	4.70	T.
Iron City	73	13	42.4	4.88	
Jackson	70	17	44.8	4.37	
Johnsonville	70	15	42.3	3.86	T.
Jonesboro	66	18	39.4	1.85	T.
Kenton	66	18	43.0	3.67	0.8
Lafayette	69	14	41.0	4.09	T.
Lewisburg	73	15	41.8	4.27	T.
Lynnville	69	20	41.6	4.20	T.
McMinnville	72	15	41.8	3.76	0.3
Maryville	68	17	41.2	4.21	T.
Milan	68	19	41.0	3.54	T.
Newport	71	17	40.3	3.02	
Palmetto	76	16	42.4	3.93	T.
Pinewood	73	13	41.8	4.05	0.5
Pope	75	12	42.3	4.70	T.
Rogersville	67	15	39.4	3.18	T.
Rugby	67	8	36.0	3.98	4.0
Savannah	78	17	42.9	3.00	T.
Sevierville	71	11	39.6	4.30	T.
Sewanee	65	17	38.2	1.70	
Silver Lake	59	13	35.8	4.04	2.0
Sparta	71	14	41.4	3.75	T.
Springdale	66	13	37.8	4.65	T.
Springville	68	15	41.8	4.61	0.5
Tellico Plains	71	15	43.4	3.57	T.
Tracy City	68	16	37.8	4.14	0.5
Trenton	67	18	42.5	3.86	T.
Tullahoma	70	15	41.8	7.32	T.
Union City	65[d]	17[h]	40.6[f]	4.00	T.
Waynesboro	72	14	42.4	4.16	0.2
Yukon	70	19	42.8	5.13	
Texas.					
Albany	80	24	48.6	1.60	
Alvin				1.53	
Austin	71	34	52.2		
Ballinger	66	28	43.4	0.70	
Barstow	72	25	48.0		
Beaumont				1.94	
Beeville	83	35	57.7	1.17	
Big Spring	73	23	48.0	0.27	
Blanco	70	23	47.5	0.73	
Boerne	78	24	51.2	1.50	
Bonham	75	25	46.9	4.15	
Bowie	77	28	47.5	1.48	
Brazoria	80	32	57.8	5.02	
Brenham	77	35	53.9	3.18	
Brighton	78	40	60.3	1.73	
Brownsville	81	40	63.0	1.35	
Channing	74	10	39.0		
Childress	72	16	44.3	1.10	
Clarendon	69	13	40.2	1.35	T.
Clarksville	78	26	49.6	4.67	
Claud	71	13	45.0		
Claytonville	75	20	47.6	0.45	
Coleman	80	28	52.4	0.85	
College Station	73	32	53.8	1.83	
Colorado	78	22	48.4	0.44	
Columbia	78	32	55.5	2.85	
Corsicana	75	31	51.2	3.84	
Crockett	78	31	52.4	4.79	
Cross Bar Ranch				1.40	
Cuero	75	35	56.2	1.99	
Dalhart	85	10	41.0	1.90	14.0
Dallas	80	26	57.6	4.57	
Danevang	78	36	57.6	4.65	
Decatur				1.49	
Denison				1.56	
Dialville	76	30	51.2	4.83	
Dublin	75	30	49.7	1.85	
Duval	75	32	53.0	1.08	
Eagle Pass	80	33	54.9	T.	
Earls Ranch				3.02	
Encinal				0.38	
Experiment Farm	74	33	53.2	0.64	
Falfurrias	85	38	61.4	0.63	
Fort Clark	73	32	52.0		
Fort McIntosh	81	33	55.4	0.70	
Fort Stockton	81	21	51.6		

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fredericksburg	74[e]	28[e]	59.9[e]	0.27	
Gainesville	73	28	47.2	1.82	
Gatesville	78	27	50.8	2.54	
Georgetown	76	28	51.5	1.10	
Graham	83	23	50.4	1.59	
Grapevine	81[e]	28[e]	50.4[e]	1.66	
Greenville	76	29	48.4	3.67	
Gonzales				1.90	
Hallettsville	76	34	56.0	3.19	
Haskell	76	23	46.9	0.99	
Hebbronville				0.98	
Hempstead				4.65	
Henrietta	81	23	48.8	2.30	
Hereford				0.60	6.0
Hondo	77	34	55.6	0.45	
Houston	79	34	55.0	4.76	
Jewett	75	27	51.7	2.60	
Junction	80	16	44.6	0.12	
Kaufmann	74	30	49.7	4.79	
Keene	78	31	50.0	2.84	
Kerrville	84	24	52.1	0.21	
Knickerbocker	79	23	50.0	0.23	
Kopperl				2.18	
Lampasas	81	26	49.2	1.44	
Laureles Ranch				1.70	
Liberty	83	31	55.0	4.80	
Llano	80	29	52.1	0.06	
Longview	76	31	48.9	3.67	
Lufkin	82	27	53.0	6.37	
Luling	77	33	53.1	1.61	
McLean	72	12	40.2	1.37	1.0
Memphis	73	18	44.4	1.20	
Mexia	76	33	49.4	2.29	
Miami	68	12	41.5	1.11	2.0
Mount Blanco	70	15	42.2	0.79	
Nacogdoches	79	27	51.0	4.55	
Nazareth	67[e]	10[e]	38.7[e]	0.70	2.0
Panter				1.99	
Paris	76	24	45.8	4.45	
Pierce	75	35	51.4	2.60	
Plemons	71	5	36.2	2.18	6.5
Port Lavaca	78	37	59.2	2.35	
Quanah	78	11	40.6	1.15	
Rossville				0.64	
Runge				1.56	
Sabinal	85	34	55.4	0.11	
San Angelo	79	26	48.4	0.40	
San Saba	81	26	50.1	0.44	
San Marcos	75	31	52.7	1.02	
Santa Gertrudes				1.20	
Seymour	77	26	46.6	0.97	
Sonora	83	24	48.9	T.	
Sugarland	78	33	55.0	2.31	
Sulphur Springs	75	30	48.8	4.21	
Temple	75	30	49.4	2.84	
Texline	71	5	37.0	0.60	
Tulia				1.25	5.0
Valley Junction				1.43	
Victoria	79	36	56.8	1.96	
Waco	76	33	50.6	4.03	
Waxahachie	80	24	47.7	4.13	
Weatherford	77	28	47.2	2.06	
Wichita Falls	77	25	49.6	0.15	
Wills Point	74	26	48.0	4.22	
Utah.					
Alpine				2.63	
Annabella				0.99	25.0
Beaver	62[e]	− 2[e]	33.1[e]	0.93	8.0
Castle Dale	56	− 1	28.8	0.70	
Cedar City	59	11	35.8	0.93	15.0
Corinne	53	8	31.1	3.29	14.0
Coyoto	58	1	32.3	0.40	4.0
Deseret	57	6	30.6	0.79	7.5
Emery	55	5	30.3	0.20	2.0
Enterprise				0.10	1.0
Escalante	57	8	33.1	0.40	
Experiment Farm	68	17	40.7		
Farmington	51	10	33.5	3.48	21.6
Fillmore	63	12	35.6	1.86	
Fort Duchesne	49	− 9	22.6	0.54	4.8
Garrison	67[e]	8[e]	33.6[e]	0.20	
Government Creek	53	9	31.7	1.72	12.0
Grantsville				1.28	
Grayson	50	9	30.9	1.63	7.8
Green River	51	7	30.9	0.30	2.5
Heber	55	−15	26.2	2.71	
Henefer	55	−18	24.7	3.96	24.5
Hite	58	18	39.6	0.30	T.
Huntsville				3.60	36.0
Ibapah	47	5	27.2	1.68	19.0
Kanosh				2.00	
Kelton	46	− 2	26.0	1.50	12.0
Levan	55	3	30.5	1.89	14.1
Loa	45	−12	23.6	0.60	6.0
Logan	49	0	28.5	1.46	6.5
Marion				3.51	26.0
Meadowville	43	− 2	25.0	2.21	14.5
Milford	51	6	31.6	0.85	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Utah—Cont'd.					
Millville				1.39	
Minersville				1.54	15.4
Moab	56	12	35.0	0.39	2.0
Morgan				3.58	25.5
Mount Nebo	54[b]	1[c]	33.8[c]	1.34	10.5
Mount Pleasant	58[c]	−1[d]	28.5[d]	1.34	
Nephi				2.01	11.0
Oak City	52	15	31.4	1.51	
Ogden	50	7	31.6	2.24	10.8
Park City	48	0	25.2	3.90	
Parowan	62	10	33.6	1.20	
Payson				2.19	17.0
Pinto				0.52	
Provo	52	10	32.7	2.60	16.5
Ranch	60[g]	−2	30.6[d]	2.01	
Randolph				1.32	6.0
Richfield	57	1	30.0	0.65	6.5
St. George	67	20	43.3	0.17	
Saltair	52	6	27.8	1.68	13.0
Scipio	61	−10	33.5	2.47	13.0
Snowville	54	−8	26.4	1.90	
Soldier Summit	60	−12	24.3	1.60	16.0
Springdale	70	18	43.6	0.17	4.0
Sunnyside				0.80	8.0
Theodore	50	−7	25.2	0.58	5.8
Thistle	62	−14	37.0	2.70	27.0
Tooele	57	11	33.4	2.00	
Tropic	58[e]	8[e]	34.8[e]	0.08	0.8
Trout Creek	60	5	31.1	0.95	9.5
Utah Lake				2.09	
Verdure				1.23	12.0
Wellington	52	0	27.6	0.20	2.0
Woodruff	47	−22	18.2	1.80	9.0
Vermont.					
Bloomfield	52	−8	24.7	3.46	5.8
Cavendish	52[c]	1[b]	26.7[c]	3.18	9.0
Chelsea	44	−1	23.6	3.52	11.0
Enosburg Falls	52	−14	25.4	3.93	14.5
Jacksonville	50	10	28.2	3.81	26.7
Norwich				2.98	7.0
St. Johnsbury	45	−4	24.0	3.90	7.0
Wells	54	0	28.5	3.66	6.0
Woodstock	46	0	23.8	3.76	12.0
Virginia.					
Arvonia	69	12	39.2	3.58	T.
Ashland	68	17	39.6	3.66	
Bigstone Gap	63	15	38.6	3.69	2.0
Blacksburg	68	11	35.2	2.23	3.8
Burkes Garden	60	7	33.0	3.08	5.0
Charlottesville	72	18	41.2	5.86	1.2
Columbia	68	17	39.4	3.97	T.
Culpeper	64	14	36.4	4.10	T.
Dale Enterprise	64	11	36.8	3.10	2.5
Danville				4.37	
Dinwiddie	68	12	40.5	4.24	T.
Doswell	72	10	40.8	3.18	
Elk Knob	58	14	37.4	2.85	1.5
Fredericksburg	70	15	39.8	3.25	0.2
Hampton	64	24	44.8	3.41	2.0
Hot Springs	58	11	32.7	5.21	4.6
Lexington	66	15	36.2	6.59	2.0
Lincoln	66	14	36.4	4.04	2.0
Marion	63	14	37.8	3.56	4.0
Newport News	66	25	44.2	3.80	3.5
Nokesville (near)	68	16	38.7	4.98	
Quantico	68	13	35.7	3.22	T.
Roanoke	66[f]	19[f]	39.9[f]	4.43	1.3
Rocky Mount	66	15	39.1	4.57	2.0
Saxe	66	15	40.0	3.65	
Shenandoah				2.35	2.0
Spottsville	68	17	43.0	4.23	1.0
Staunton	66	18	39.6	3.30	6.6
Stephens City	67	12	37.0	3.50	0.3
Warsaw	69	17	39.9	2.49	
Williamsburg	68	19	42.3	4.65	0.5
Woodstock	68	14	37.3	2.79	3.9
Washington.					
Aberdeen	58	28	41.0	17.54	2.0
Anacortes	58	24[f]	41.1[c]	3.98	
Baker	57	25	38.6	8.81	2.0
Bellingham	60	24	42.9	3.94	
Blaine	60	22	40.4	6.88	1.0
Cedar River				7.14	11.1
Centralia	58	28	40.9	9.15	2.2
Cheney	53	10	33.4	2.14	2.5
Clearwater	57	30	42.2	20.09	
Cle Elum	45	11	31.4	5.12	17.0
Colfax	55	12	36.4	2.88	4.0
Coleville	51	6	30.0	2.83	15.8
Conconully	45	5	27.6	2.92	19.8
Crescent	44	7	30.4	2.67	8.0
Cusick	49	3	28.7	3.95	31.0
Dayton	60	20	38.2	3.11	5.0
Detroit	54	26	41.2	11.02	
East Sound	70	26	41.6	5.55	
Ellensburg	47	11	31.4	2.12	6.8
Gardena	62	21	39.2	1.53	1.5
Hatton	55	17	35.3	1.36	0.6
Washington—Cont'd.					
Huntsville				3.02	4.0
Kennewick	58	22	38.8	1.06	1.0
Kiona	57	16	38.8	0.89	1.0
Kosmos	62	24	39.9	10.93	2.5
Lacenter	56	24	39.9	10.82	4.0
Lakeside	48	15	32.8	2.78	12.0
Lester	57	22	36.4	7.55	16.0
Mottinger Ranch	55	21	39.0	1.61	1.0
Mount Pleasant	58	28	41.5	11.88	
Moxee	50	13	33.3	1.78	3.1
Northport	42	−1	27.4	2.51	19.2
Odessa	47[c]	18	35.3[b]	1.78	2.0
Olga	58	29	42.1	4.90	
Olympia	54	27	41.0	12.03	0.4
Pinehill	52	26	36.8	8.50	21.8
Pomeroy	61	11	36.6	1.79	1.0
Port Townsend	58	30	42.6	3.88	
Pullman	59	17	35.2	4.30	5.5
Quinault	35	27	40.8	22.18	
Republic	45	−4	26.5	1.96	17.0
Rex Creek	48[c]	19[a]	36.1[b]	5.57	
Ritzville				2.31	
Rock Lake	49	14	33.6	3.25	5.0
Rosalia	51[f]	9[g]	33.2[g]	3.00	3.2
Sedro-Woolley				3.63	
Sixprong	56	19	36.9	3.23	5.0
Snohomish	63	21	40.6	5.74	
Snoqualmie	60	23	41.5	7.30	
South Bend	60	29	42.2	13.47	T.
Stehekin	52[c]	10[c]	32.3[c]	3.66	8.6
Sumner	58[i]	22[i]	40.2[i]	5.92	T.
Twisp	41	−9	23.5	2.94	41.0
Vancouver	59	28	42.0	8.81	T.
Vashon	54	29	42.4	8.73	T.
Wahluke	55	19	36.4	0.83	0.8
Waterville	47	0	26.4	1.69	16.9
Wenatchee (near)	48	15	31.6	3.12	12.3
Westport				16.81	
Wilbur	48	9	31.2	1.97	2.0
Yale	57	30	41.0	20.85	7.0
Zindel	57	17	39.2	1.83	
West Virginia.					
Bancroft	67	14	36.4	2.62	1.2
Bayard	57	−2	30.2	4.11	18.5
Beckley	66	10	34.8	4.51	6.0
Bens Run	64	12	35.4	4.13	4.0
Burlington	67[d]	6[d]	33.0[d]	2.90	13.0
Cairo	68	12	37.4	3.96	2.0
Central Station	64	10	34.0	3.51	6.0
Charleston	66	18	40.6	2.37	T.
Creston	64	12	35.6	1.96	2.0
Cuba	65	9	36.0	3.40	3.6
Doane[g]	66	22	39.4		
Elkhorn	64	17	37.0	2.97	5.0
Fairmont	70	13	36.9	3.11	1.7
Franklin	65	10	35.0	3.87	6.0
Glenville	68	13	37.4	3.98	7.0
Grafton	67	10	36.1	3.38	5.5
Green Sulphur Springs	64	10	34.6	2.89	
Harper's Ferry				2.60	4.0
Hinton	62[d]	17[a]	37.0[c]	4.08	0.5
Huntington	65	14	36.0	2.02	0.6
Leonard	56	12	32.7	3.26	14.0
Lewisburg	61	9	33.0	3.58	5.0
Logan	67	22	41.5	3.54	T.
Lost City	62	12	37.3	4.71	5.0
Lost Creek	68	10	35.1	4.03	3.0
Mannington	65	10	34.4	3.67	4.7
Martinsburg	63	12	33.4	3.60	6.5
Moorefield	68	6	35.2	2.35	5.0
Morgantown	66	11	35.2	3.04	6.0
Moundsville	63	11	36.1	2.62	1.2
New Cumberland	60	7	33.3	0.70	T.
New Martinsville	68	16	36.8	3.50	T.
Nuttallburg				2.73	9.0
Oceana	66	18	39.0	3.55	
Parsons	64	1	32.4	4.80	13.5
Philippi	68	10	35.4	3.56	9.1
Pickens	58	8	30.6	4.45	17.0
Point Pleasant	64	15	37.6	2.66	1.0
Powellton	66	16	38.2	1.95	1.0
Princeton	60	10	32.6	5.35	8.5
Romney	66	8	32.8	2.33	6.2
Rowlesburg				4.28	8.9
Ryan	69	12	36.0	2.85	4.5
Smithfield	63	16	35.7	3.77	1.8
Southside	66	10	36.8	2.84	2.5
Speer's Ferry				3.36	1.0
Spencer	68	10	35.2	1.77	2.7
Sutton	68	11	36.8	3.70	9.0
Terra Alta	58	6	31.6	9.31	18.0
Union	59	10	33.3	3.55	0.5
Uppertract	65[c]	10[c]	35.6[c]	3.69	6.2
Valley Fork	67	12	38.0	1.76	2.1
Webster Springs	63	9	36.2	3.82	
Wellsburg	58	12	33.2	2.56	8.0
Weston	64	6	31.9	3.95	10.5
Wheeling				2.65	
West Virginia—Cont'd.					
Williamson	65	19	39.6	2.36	0.2
Woodstock				2.79	
Wisconsin.					
Amherst	48	0	23.4	1.05	13.0
Antigo	42	−4	21.6	0.82	8.2
Appleton	43	7	25.0	1.54	14.8
Appleton Marsh	47	0	23.4	0.79	10.8
Ashland	48	0	24.4	0.30	3.2
Barron	45	−12	21.2		
Beloit	57	8	30.6		
Brodhead	50	5	28.4	1.23	6.5
Burnett	45	4	24.6	1.26	7.5
Butternut	45	−11	19.9	0.48	5.5
Cecil	44	−5	22.9	2.55	19.5
Chilton	43	7	23.8	2.04	14.5
Cranden	44	2	22.0	0.07	0.7
Delavan	48	1	26.6	1.23	9.2
Dodgeville	44	11	26.9	1.20	11.0
Downing	48	−12	22.2	0.30	6.0
Eau Claire	44	−2	23.8	0.42	4.2
Florence	44	−5	21.8	0.60	6.0
Fond du Lac	46	6	25.6	0.76	9.5
Grand Rapids	44	−1	23.6	1.14	9.0
Grand River Locks				1.10	9.5
Grantsburg	47	−18	19.6	0.50	5.0
Hancock	42	−2	23.4	1.91	11.0
Hayward	45	−21	18.4	0.47	4.8
Hillsboro	46	0	24.1	1.05	8.0
Koepenick	45	−9	20.1	0.90	9.0
Lake Mills	48	3	25.8	1.68	8.7
Lancaster	48	5	27.8	0.66	5.0
Manitowoc	45	12	26.5	1.72	9.0
Mauston	46	5	25.8	1.53	6.5
Meadow Valley	46	0	23.0	1.35	11.0
Medford	44	−2	22.0	0.30	3.0
Menasha				1.09	9.5
Merrill	41	−4	20.8	0.66	7.0
Minocqua	45	−11	19.7	0.15	1.5
Mount Horeb	47	2	26.0	1.81	9.0
New London	44	2	23.9	1.70	14.0
New Richmond	48	−10	23.1	0.50	5.0
Oconto	48	1	25.0	2.38	18.0
Osceola	44	−14	21.9	0.20	4.0
Oshkosh	44	6	25.1	1.60	9.0
Pine River	46	3	23.8	1.59	10.7
Portage	48	7	26.9	1.72	7.0
Port Washington	45	9	25.6	1.67	11.7
Prairie du Chien	51	6	28.2	0.75	6.0
Prentice	41	−8	19.8	0.33	2.5
Racine	51	12	28.9	1.75	
Sheboygan	45	10	28.2	1.93	15.0
Shullsburg	51	5	27.6	1.11	5.0
Solon Springs	42[e]	−18[e]	18.9[e]	0.40	4.0
Spooner	51	−15	20.4	0.17	2.2
Stanley	43	−5	21.1	1.00	9.4
Stevens Point	45	0	22.4	1.18	6.5
Sturgeon Bay	44	5	25.8	2.45	31.0
Valley Junction	45	−1	23.2	1.07	8.8
Viroqua	43	5	25.6	1.55	7.0
Watertown	46	5	25.2	2.06	12.0
Waukesha	47	10	26.2	2.08	13.6
Waupaca	47	−1	24.2	1.84	15.2
Wausau	42	3	23.6	1.05	10.0
Weyerhauser	46	−14	20.0	0.65	8.1
Whitehall	50	−5	25.4		
Wyoming.					
Afton	52	−32	21.1	2.45	23.0
Barnum				0.80	8.0
Basin	49	−11	23.4	0.00	
Bedford	51	−34	19.2	2.89	28.3
Blue Cap	44	−17	18.4	3.10	31.0
Border	49	−32	17.8	1.96	
Buffalo	64	1	32.2	0.43	4.2
Camp Colter	54	−10	24.6	T.	T.
Chugwater	65	−7	29.0	0.75	7.5
Clark	58	0	31.6	0.33	1.0
Clear Creek Cabin	58	−9	22.6	0.53	13.0
Daniel	59	−29	16.7	1.00	10.0
Dubois	58	−22	19.8	0.60	3.0
Eatons Ranch	73	6	35.8	0.45	4.5
Elk Mountain				2.19	43.8
Evanston	55	−16	22.7	1.38	9.5
Experiment Farm				0.06	1.0
Fayette	58	−38	13.8	0.66	15.4
Fontenelle	48	−30	15.7	0.40	4.0
Fort Laramie	61	−17	26.9	0.43	10.3
Granite Canyon	60	−2	27.3	0.68	6.8
Granite Springs	55	0	28.6	0.75	4.5
Green River	51	−25	20.5	0.21	3.5
Griggs	66	−24	23.9	1.19	11.9
Hyattville	62	−7	27.2	T.	T.
Kinnear	48	−31	18.0	0.17	
Kirtley	66	−5	26.4	0.38	
Kirwin	46	−15	18.6	2.40	24.0
Laramie	56	−9	23.4	0.23	2.5
Leo	53	−17	25.5	0.62	11.8
Lusk	67	−5	25.9	1.50	15.0
Moorcroft	61	−13	24.4	0.10	1.0

TABLE II.—*Climatological record of cooperative observers*—Continued. *Late reports for November, 1907.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wyoming—Cont'd.	°	°	°	*Ins.*	*Ins.*
Moore	58^{e}	0^{e}	30.0^{e}	0.35	.....
Newcastle	63	− 3	27.3	0.35	3.5
Pathfinder	52	−11	26.0	0.21	4.6
Phillips	68^{f}	-5^{f}	30.6^{f}	1.10	11.0
Pine Bluff	70	−15	29.6	0.20	2.0
Pinedale	48	−25	15.8	0.98	11.5
Rawlins	50	− 5	25.1	0.37	5.8
Riverton	51	−31	15.6	0.38	4.7
Saratoga	56	−22	20.6	1.26	14.5
Sheridan	63	−15	36.6	0.30	3.0
Shoshone	59	7	31.6	0.31	2.8
Sunshine	.....	.....	.....	2.32	.....
Thermopolis	65	−17	25.4	0.26	3.2
Wheatland	70	− 1	33.6	1.16	18.0
Worland	56	−18	22.4	0.22	2.2
Wyncote	65^{e}	-19^{b}	28.4^{d}	0.20	2.5
Yellowstone Pk. (Lake)	34	−20	9.0	4.07	43.5
Yellowstone Pk. (Norris)	46	−31	16.8	1.53	31.0
YellowstonePk. (Riv'side)	47	−27	16.0	2.40	24.0
YellowstonePk. (Sn'ke R.)	.....	.....	.....	1.91	46.0
Yellowstone Pk. (Soda B.)	44	−32	15.1	1.10	11.0
Yellowstone Pk. (S. Pass)	.....	.....	.....	1.56	.....
Yellowstone Pk. (Up. Ba.)	49	−28	17.8	2.02	35.0
Porto Rico.					
Aguirre	93	67	78.4	1.78	
Albonito	85	57	71.4	4.55	
Anasco	89	62	76.5	8.51	
Arecibo	89	57	73.0	0.04	
Bayamon	91	62	76.2	8.97	
Caguas	89	58	72.9	5.46	
Canovanas	84	68	76.5	12.93	
Cayey	84	57	71.0	5.30	
Cidra	85	59	72.0	7.57	
Coloso	89	65	77.0	3.77	
Comerio [h]	90	61	74.4	......	
Corozal	86	61	75.3	12.68	
Culebra	84	69	77.3	5.22	
Fajardo	89	67	78.4	10.42	
Guayama	.....	.....	.....	2.05	
Humacao	87	65	75.6	8.84	
Ingenio	.....	.....	.....	6.85	
Isabela	90	67	77.4	5.90	
Isolina	87	60	72.0	11.48	
Juana Diaz [h]	90	57	74.8	......	
La Carmelita	86	59	72.9	6.78	
Lares	85	56	71.8	7.57	
Las Marias	85	56	71.6	9.03	
Manati	84	64	74.3	7.18	
Maricao	84	57	71.6	7.17	
Maunabo	91	69	79.4	7.86	
Mayaguez	94	61	75.9	5.11	
Ponce	91	65	77.8	2.08	
Rio Blanco	90	55	74.2	10.36	
Rio Piedras	.....	.....	.....	9.22	
San German	88	60	74.8	7.80	
San Lorenzo	88	59	74.0	5.73	
San Salvador	85	60	72.1	8.37	
San Sebastin	.....	.....	.....	5.13	
Santa Isabel	89	64	76.7	1.43	
Vieques	87	69	77.7	6.54	
Yauco	90^{d}	58^{d}	75.4^{d}	4.47	
New Brunswick.					
St. John	50	11	27.3	5.44	14.7

Late reports for November, 1907.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alaska.	°	°	°	*Ins.*	*Ins.*
Cillachaket	31	−47	−8.4	0.63	9.8
Circle City [6]	34	−44	−9.7	......	.....
Copper Center	49	−26	4.0	0.80	8.0
Fairbanks	38	−41	3.5	0.35	3.5
Fort Egbert	.....	.....	.....	0.40	4.0
Fort Gibbon	.....	.....	.....	0.03	1.5
Fort Liscum	47	11	29.2	7.94	38.1
Holy Cross Mission	31	−18	4.2	0.51	.....
Juneau	51	30	39.5	4.58	8.5
Katalla	54	20	35.3	12.44	15.5
Kenai	41	−12	21.7	......	.....
Ketchumstock	.....	.....	.....	0.40	4.0
Loring	57	29	38.3	24.55	1.6
Nome	39	−12	9.9	0.06	2.0
North Fork	35	−47	−4.8	0.20	2.0
Orca	.....	.....	.....	13.16	17.0
Rampart	27	−39	−4.2	0.55	6.3
Sitka	60	31	40.4	12.13	0.7
Skagway	53	24	35.3	4.23	10.0
Sunrise	51	− 3	24.5	7.32	31.4
Tonsina	47	−24	8.0	0.40	4.0
Wood Island	47	13	32.4	7.70	4.5
Alabama.					
Oneonto	75	17	47.0	5.68	T.
California.					
Merced	.....	.....	.....	0.00	
Modesto *[1]	70	38	55.4	0.06	
Sisquoc	.....	.....	.....	0.00	
Connecticut.					
Farmington	.....	.....	.....	5.31	
Florida.					
Flamingo	.....	.....	.....	1.13	
Plant City	88	38	68.0	0.70	
Iowa.					
Elkader	56	9	36.3	1.39	1.0
Maryland.					
Cheltenham	64	23	44.7	5.42	T.
Solomons	63	31	46.8	4.07	T.
Minnesota.					
Milaca	56	2	32.4	......	.....
Zembrota	53	7	33.4	0.45	T.
Nebraska.					
Bradshaw	.....	.....	.....	0.13	.....
Edgar	.....	.....	.....	0.28	.....
North Carolina.					
Hendersonville	71	20	45.3	6.29	
Sloan	79^{f}	25^{f}	52.6^{f}	3.05	
North Dakota.					
Elbowoods	61	7	34.4	T.	0.2
Mott	68	4	30.4	0.02	0.2
South Carolina.					
Florence	79	28	53.4	3.06	
South Dakota.					
Alexandria	62	6	34.6	T.	T.
Watertown	57	0	31.2	0.00	
Wisconsin.					
Wausau	52	8	32.8	0.77	1.5

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks of whatever duration, in the precipitation record receive appropriate notice.

TABLE III.—*Wind resultants, from observations at 8 a. m. and 8 p. m., daily, during the month of December, 1907.*

Stations.	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	Hours.	Hours.	Hours.	°	Hours.
New England.						
Eastport, Me	16	19	5	37	s. 85 w.	32
Portland, Me	17	19	1	35	s. 87 w.	34
Concord, N. H. †	9	10	7	13	s. 80 w.	6
Burlington, Vt. †	9	14	5	7	s. 22 w.	5
Northfield, Vt	23	27	7	19	s. 72 w.	13
Boston, Mass	14	18	2	38	s. 84 w.	36
Nantucket, Mass	15	15	9	37	w.	28
Block Island, R. I	16	17	7	35	s. 88 w.	28
Providence, R. I	14	14	3	41	w.	38
Hartford, Conn	19	22	2	30	s. 84 w.	28
New Haven, Conn	17	17	7	33	w.	26
Middle Atlantic States.						
Albany, N. Y	17	26	4	22	s. 63 w.	20
Binghamton, N. Y. †	9	3	12	13	n. 9 w.	6
New York, N. Y	11	12	9	39	s. 88 w.	30
Harrisburg, Pa	17	11	12	34	n. 75 w.	23
Philadelphia, Pa	17	17	11	31	w.	20
Scranton, Pa	15	24	12	30	s. 63 w.	20
Atlantic City, N. J	19	15	4	35	n. 83 w.	31
Cape May, N. J	18	19	7	30	s. 88 w.	23
Baltimore, Md	19	13	8	36	n. 78 w.	29
Washington, D. C	27	15	11	28	n. 55 w.	21
Lynchburg, Va	18	17	12	28	n. 87 w.	16
Mount Weather, Va	24	14	7	33	n. 69 w.	28
Norfolk, Va	15	24	16	21	s. 29 w.	10
Richmond, Va	10	27	15	20	s. 16 w.	18
Wytheville, Va	14	6	13	38	n. 72 w.	26
South Atlantic States.						
Asheville, N. C	27	19	15	21	n. 37 w.	10
Charlotte, N. C	17	26	10	20	s. 48 w.	14
Hatteras, N. C	26	13	15	25	n. 38 w.	16
Raleigh, N. C	17	20	10	31	s. 82 w.	21
Wilmington, N. C	17	19	11	30	s. 84 w.	19
Charleston, S. C	18	18	13	28	w.	15
Columbia, S. C	16	19	13	27	s. 78 w.	14
Augusta, Ga	15	17	15	32	s. 83 w.	17
Savannah, Ga	19	19	12	25	w.	13
Jacksonville, Fla	28	16	17	16	n. 5 e.	12
Florida Peninsula.						
Jupiter, Fla	17	15	21	22	n. 27 w.	2
Key West, Fla	33	7	33	7	n. 45 e.	37
Tampa, Fla	32	11	23	13	n. 25 e.	23
Eastern Gulf States.						
Atlanta, Ga	20	14	16	28	n. 63 w.	13
Macon, Ga. †	14	8	5	14	n. 56 w.	11
Thomasville, Ga	20	16	23	16	n. 60 e.	8
Pensacola, Fla. †	15	2	13	9	n. 17 e.	14
Anniston, Ala	18	26	21	16	s. 32 e.	9
Birmingham, Ala	17	21	22	17	s. 51 e.	6
Mobile, Ala	24	17	18	17	n. 8 e.	7
Montgomery, Ala	22	16	20	22	n. 18 w.	6
Meridian, Miss	18	15	20	20	n.	3
Vicksburg, Miss	13	15	28	20	s. 76 e.	8
New Orleans, La	19	14	25	17	n. 58 e.	9
Western Gulf States.						
Shreveport, La	18	20	19	20	s. 27 w.	2
Bentonville, Ark. †	7	16	7	8	s. 6 w.	9
Fort Smith, Ark	10	11	30	22	s. 83 e.	8
Little Rock, Ark	13	17	19	23	s. 45 w.	6
Corpus Christi, Tex	31	19	11	13	n. 9 w.	12
Fort Worth, Tex	15	23	18	24	s. 37 w.	10
Galveston, Tex	20	15	22	18	n. 39 e.	6
Palestine, Tex	24	21	17	10	n. 67 e.	8
San Antonio, Tex	24	18	21	15	n. 45 e.	8
Taylor, Tex. †	13	10	3	13	n. 73 w.	10
Ohio Valley and Tennessee.						
Chattanooga, Tenn	20	22	14	20	s. 72 w.	6
Knoxville, Tenn	23	19	17	20	n. 37 w.	5
Memphis, Tenn	11	25	21	16	s. 20 e.	15
Nashville, Tenn	13	18	17	24	s. 54 w.	9
Lexington, Ky. †	6	13	9	12	s. 23 w.	8
Louisville, Ky	13	28	15	23	s. 28 w.	17
Evansville, Ind. †	9	10	8	11	s. 72 w.	3
Indianapolis, Ind	12	28	16	18	s. 7 w.	16
Cincinnati, Ohio	12	23	18	25	s. 32 w.	13
Columbus, Ohio	13	23	12	26	s. 54 w.	17
Pittsburg, Pa	14	16	11	34	s. 85 w.	23
Parkersburg, W. Va	11	21	11	30	s. 62 w.	22
Elkins, W. Va	17	19	6	32	s. 86 w.	26
Lower Lake Region.						
Buffalo, N. Y	9	18	7	34	s. 72 w.	28
Canton, N. Y. †	5	10	7	16	s. 61 w.	10
Oswego, N. Y	13	29	9	24	s. 43 w.	22
Rochester, N. Y	1	25	8	41	s. 54 w.	41
Syracuse, N. Y	4	34	8	27	s. 32 w.	36
Erie, Pa	8	26	8	31	s. 52 w.	29
Cleveland, Ohio	6	34	14	21	s. 14 w.	29
Sandusky, Ohio †	4	16	6	15	s. 37 w.	15
Toledo, Ohio	12	29	10	30	s. 50 w.	26
Detroit, Mich	10	26	9	32	s. 55 w.	28
Upper Lake Region.						
Alpena, Mich	17	21	4	34	s. 82 w.	30
Escanaba, Mich	23	18	6	33	n. 80 w.	28
Grand Haven, Mich	19	21	14	22	s. 76 w.	8
Grand Rapids, Mich	17	21	12	24	s. 72 w.	13
Houghton, Mich. †	9	2	11	12	n. 8 w.	7
Marquette, Mich	16	18	5	35	s. 86 w.	30
Port Huron, Mich	11	26	8	34	s. 60 w.	30
Sault Sainte Marie, Mich	20	17	21	19	n. 34 e.	4
Chicago, Ill	17	23	7	32	s. 77 w.	26
Milwaukee, Wis	16	15	8	34	n. 88 w.	26
Green Bay, Wis	18	28	4	28	s. 67 w.	26
Duluth, Minn	17	17	6	37	w.	31

Stations.	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	Hours.	Hours.	Hours.	°	Hours.
North Dakota.						
Moorhead, Minn	20	28	6	19	s. 58 w.	15
Bismarck, N. Dak	24	16	11	28	n. 65 w.	19
Devils Lake, N. Dak	13	26	10	25	s. 49 w.	20
Williston, N. Dak	17	29	8	20	s. 45 w.	17
Upper Mississippi Valley.						
Minneapolis, Minn. *	10	10	6	12	w.	6
St. Paul, Minn	18	23	19	19	s.	5
La Crosse, Wis. †	11	11	7	9	w.	2
Madison, Wis	24	22	10	26	n. 83 w.	16
Charles City, Iowa	23	21	13	22	n. 77 w.	9
Davenport, Iowa	18	16	16	26	n. 79 w.	10
Des Moines, Iowa	17	23	12	23	s. 61 w.	12
Dubuque, Iowa	22	19	10	26	n. 79 w.	16
Keokuk, Iowa	19	21	15	19	s. 63 w.	4
Cairo, Ill	16	27	14	16	s. 10 w.	11
La Salle, Ill. †	10	10	6	12	w.	6
Peoria, Ill	18	23	12	17	s. 45 w.	7
Springfield, Ill	17	22	14	18	s. 39 w.	6
Hannibal, Mo. †	8	9	7	13	s. 80 w.	6
St. Louis, Mo	13	23	16	19	s. 17 w.	10
Missouri Valley.						
Columbia, Mo. *	9	10	8	10	s. 63 w.	2
Kansas City, Mo	21	24	13	18	s. 59 w.	6
Springfield, Mo	17	22	16	21	s. 45 w.	7
Iola, Kans. †	9	12	5	10	s. 59 w.	6
Topeka, Kans. *	10	11	9	7	s. 63 e.	2
Lincoln, Nebr	20	26	14	13	s. 9 e.	6
Omaha, Nebr	21	23	14	16	s. 45 w.	3
Valentine, Nebr	21	11	7	36	n. 71 w.	31
Sioux City, Iowa †	9	15	7	8	s. 9 w.	6
Pierre, S. Dak	21	14	20	20	n.	7
Huron, S. Dak	22	20	18	17	n. 27 e.	2
Yankton, S. Dak. †	7	11	7	14	s. 60 w.	8
Northern Slope.						
Havre, Mont	15	9	17	37	n. 73 w.	21
Miles City, Mont	10	38	12	12	s.	28
Helena, Mont	6	24	3	45	s. 67 w.	46
Kalispell, Mont	20	10	3	44	n. 76 w.	42
Rapid City, S. Dak	.....	.....	.....	.....	.....	.....
Cheyenne, Wyo	22	9	1	44	n. 73 w.	45
Lander, Wyo	20	19	16	18	n. 63 w.	2
Sheridan, Wyo	17	26	12	21	s. 45 w.	13
Yellowstone Park, Wyo	6	44	6	24	s. 25 w.	42
North Platte, Nebr	20	11	8	33	n. 70 w.	27
Middle Slope.						
Denver, Colo	15	34	8	14	s. 18 w.	20
Pueblo, Colo	22	10	19	24	n. 23 w.	13
Concordia, Kans	18	20	13	25	s. 81 w.	12
Dodge, Kans	16	18	12	26	s. 83 w.	17
Wichita, Kans	20	23	12	22	s. 73 w.	10
Oklahoma, Okla	21	30	11	15	s. 24 w.	10
Southern Slope.						
Abilene, Tex	17	29	8	21	s. 47 w.	18
Amarillo, Tex	10	29	4	27	s. 50 w.	30
Del Rio, Tex. †	8	4	9	16	n. 60 w.	8
Roswell, N. Mex	26	14	10	25	n. 51 w.	19
Southern Plateau.						
El Paso, Tex	23	7	12	36	n. 56 w.	29
Santa Fe, N. Mex	36	9	28	6	n. 39 e.	35
Flagstaff, Ariz	21	13	5	35	n. 75 w.	31
Phoenix, Ariz	12	10	32	20	n. 81 e.	12
Yuma, Ariz	35	9	21	10	n. 23 w.	28
Independence, Cal	22	24	8	26	s. 84 w.	18
Middle Plateau.						
Reno, Nev	9	24	10	34	s. 58 w.	28
Tonopah, Nev	7	22	21	29	s. 28 w.	17
Winnemucca, Nev	13	27	15	30	s. 47 w.	20
Modena, Utah	10	12	18	34	s. 83 w.	16
Salt Lake City, Utah	13	24	25	15	s. 42 e.	15
Durango, Colo	26	10	6	34	n. 60 w.	32
Grand Junction, Colo	18	7	17	32	n. 54 w.	19
Northern Plateau.						
Baker City, Oreg	7	40	19	8	s. 18 e.	35
Boise, Idaho	18	19	25	18	s. 82 e.	7
Lewiston, Idaho †	1	10	19	6	s. 55 e.	16
Pocatello, Idaho	5	32	24	19	s. 10 e.	28
Spokane, Wash	17	26	21	9	s. 53 e.	15
Walla Walla, Wash	6	41	7	15	s. 13 w.	36
North Pacific Coast Region.						
North Head, Wash	4	18	36	13	s. 59 e.	27
Port Crescent, Wash. *	4	14	17	5	s. 50 e.	16
Seattle, Wash	11	27	32	5	s. 59 e.	31
Tacoma, Wash	15	30	15	20	s. 18 w.	16
Tatoosh Island, Wash	2	16	38	14	s. 60 e.	28
Portland, Oreg	12	29	22	17	s. 16 e.	18
Roseburg, Oreg	9	37	23	10	s. 25 e.	31
Middle Pacific Coast Region.						
Eureka, Cal	8	36	21	14	s. 14 e.	29
Mount Tamalpais, Cal	19	21	10	29	s. 84 w.	19
Red Bluff, Cal	24	22	21	16	n. 68 e.	5
Sacramento, Cal	15	28	25	10	s. 49 e.	20
San Francisco, Cal	19	17	16	25	n. 77 w.	9
San Jose, Cal. †	9	7	6	18	n. 81 w.	12
Southeast Farallon, Cal. *	14	10	6	10	n. 45 w.	6
South Pacific Coast Region.						
Fresno, Cal	14	15	30	18	s. 85 e.	12
Los Angeles, Cal	21	4	20	28	n. 25 w.	19
San Diego, Cal	33	3	22	23	n. 2 w.	30
San Luis Obispo, Cal	36	12	10	14	n. 9 w.	24
West Indies						
San Juan, Porto Rico	5	16	50	1	s. 77 e.	50

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.80 in 1 hour, during December, 1907, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
Abilene, Tex	21	2:15 a. m.	9:30 a. m.	0.93	6:32 a. m.	7:00 a. m.	0.07	0.12	0.17	0.29	0.37	0.53	0.59								
Albany, N. Y	14–15			2.52														*			
Alpena, Mich	9–10			0.52														*			
Amarillo, Tex	21			1.29														*			
Anniston, Ala	28	12:10 p. m.	8:15 p. m.	0.97	12:35 p. m.	12:51 p. m.	0.01	0.10	0.42	0.66											
Asheville, N. C	22–23			1.09														0.24			
Atlanta, Ga	30	5:02 a. m.	7:57 a. m.	0.87	5:55 a. m.	6:08 a. m.	0.31	0.18	0.35	0.42											
Atlantic City, N. J	14	D. N. a. m.	5:00 p. m.	3.52	12:19 p. m.	1:09 p. m.	1.49	0.05	0.10	0.15	0.19	0.24	0.29	0.34	0.39	0.45	0.51				
					1:09 p. m.	2:19 p. m.		0.59	0.64	0.73	0.84	0.92	1.05	1.12	1.21	1.30	1.42	1.73	1.86		
Augusta, Ga	22–23			1.44						0.35											
Baltimore, Md	14			1.34														0.35			
Bentonville, Ark	21–22			0.85														0.26			
Binghamton, N. Y	14			1.07														0.22			
Birmingham, Ala	27–28			1.20														0.51			
Bismarck, N. Dak	14–15			0.13														*			
Block Island, R. I	23			1.31														0.40			
Boise, Idaho	25–26			0.75														0.13			
Boston, Mass	10			1.54														0.72			
Buffalo, N. Y	14–15			1.36														*			
Cairo, Ill	22			1.22														0.30			
Canton, N. Y	23–24			1.07														*			
Charles City, Iowa	29			0.48														*			
Charleston, S. C	13–14	1:55 p. m.	4:45 a. m.	2.12	1:01 a. m.	1:31 a. m.	1.24	0.08	0.22	0.29	0.38	0.44	0.51								
Charlotte, N. C	30			1.14														0.51			
Chattanooga, Tenn	9			0.65														0.34			
Cheyenne, Wyo	14			0.37														*			
Chicago, Ill	13–14			0.99														*			
Cincinnati, Ohio	22–23			1.09														0.21			
Cleveland, Ohio	30			0.35														0.18			
Columbia, Mo	22			0.58														*			
Columbia, S. C	22–23	3:40 p. m.	D. N.	1.34	1:33 a. m.	2:04 a. m.	0.67	0.06	0.21	0.26	0.31	0.36	0.52	0.59							
Columbus, Ohio	30			0.26				0.13													
Concord, N. H	23			0.82														0.35			
Corpus Christi, Tex	5–6			1.13														0.21			
Davenport, Iowa	29–30			0.17														*			
Del Rio, Tex	20–21			0.04														*			
Denver, Colo	11–12			0.27														*			
Des Moines, Iowa	9			0.63														*			
Detroit, Mich	29–30			1.12														0.25			
Dodge, Kans	21–22			0.42														*			
Dubuque, Iowa	29–30			0.39														*			
Duluth, Minn	13–14			0.32														*			
Eastport, Me	30			1.08														0.32			
Elkins, W. Va	13–14			0.85														0.21			
Erie, Pa	22–23			1.30														*			
Escanaba, Mich	9			0.64														*			
Evansville, Ind	13			0.95														0.17			
Fort Smith, Ark	21–22			1.41														0.31			
Fort Worth, Tex	21	12:10 a. m.	3:55 p. m.	1.88	10:49 a. m.	11:08 a. m.	0.88	0.08	0.23	0.52	0.65										
Galveston, Tex	21–22	3:05 p. m.	D. N	2.97	7:13 p. m.	8:25 p. m.	0.16	0.25	0.38	0.68	0.90	1.06	1.28	1.48	1.60	1.71	1.88	2.17	2.33		
Grand Haven, Mich	14			0.65														*			
Grand Rapids, Mich	9			0.81														0.20			
Green Bay, Wis	9–10			0.94														*			
Hannibal, Mo	22–23			1.40														*			
Harrisburg, Pa	9–10			1.72														0.55			
Hartford, Conn	23			1.56														0.60			
Hatteras, N. C	14			0.69														0.44			
Huron, S. Dak	29			0.41														*			
Indianapolis, Ind	22–23			1.04														*			
Iola, Kans	12–13			0.75														0.13			
Jacksonville, Fla	13–14	2:35 p. m.	D. N.	1.40	8:20 p. m.	8:45 p. m.	0.30	0.38	0.73	0.79	0.82	0.88									
Jupiter, Fla	13–14	11:50 p. m.	8:25 a. m.	1.30	11:55 p. m.	12:20 a. m.	0.01	0.05	0.19	0.38	0.54	0.64									
Kansas City, Mo	9			0.32														0.20			
Keokuk, Iowa	22–23			0.98														*			
Key West, Fla	22	5:50 a. m.	7:05 a. m.	0.50	6:00 a. m.	6:17 a. m.	0.01	0.23	0.32	0.44	0.47										
Knoxville, Tenn	29–30			2.02														0.57			
La Crosse, Wis	8–9			0.42														*			
La Salle, Ill	22–23			0.74														0.11			
Lexington, Ky	22–23			1.09														*			
Lincoln, Nebr	29			0.10														*			
Little Rock, Ark	21–22			1.85														0.35			
Los Angeles, Cal	6–7			0.61														0.17			
Louisville, Ky	22–23			1.30														0.30			
Lynchburg, Va	22–23			1.48														0.25			
Macon, Ga	22–23			2.28														0.60			
Madison, Wis	8–9			0.59									0.11								
Marquette, Mich	1			0.32														*			
Memphis, Tenn	22			1.24														0.28			
Meridian, Miss	28	6:30 a. m.	12:10 p. m.	0.85	7:48 a. m.	7:56 a. m.	0.22	0.30	0.40												
Milwaukee, Wis	22			0.38														0.16			
Minneapolis, Minn	29			0.23														*			
Mobile, Ala	9	6:40 a. m.	11:00 a. m.	1.26	8:11 a. m.	8:56 a. m.	0.06	0.12	0.21	0.55	0.69	0.78	0.79	0.81	0.89	0.96					
Do	22	D. N.	4:30 p. m.	2.69	11:37 a. m.	12:37 p. m.	0.62	0.10	0.20	0.30	0.35	0.41	0.48	0.49	0.54	0.60	0.64	0.81			
Montgomery, Ala	9			0.96														0.63			
Mount Weather, Va	13–14			1.78														*			
Nantucket, Mass	23			1.16														0.35			
Nashville, Tenn	22–23			0.82														0.42			
New Haven, Conn	23			1.16														0.53			
New Orleans, La	22	7:14 a. m.	2:20 p. m.	3.00	7:50 a. m.	8:20 a. m.	0.12	0.17	0.29	0.42	0.93	1.15	1.36								
New York, N. Y	23			1.20														0.42			
Norfolk, Va	10			0.67														0.50			
Northfield, Vt	9–10			1.40														0.19			
North Head, Wash	12–13			1.66														0.36			
Oklahoma, Okla	21–22			1.33														0.44			
Omaha, Nebr	29–30			0.17														0.07			
Palestine, Tex	21	2:55 p. m.	10:00 p. m.	1.34	3:30 p. m.	4:05 p. m.	0.22	0.14	0.37	0.54	0.59	0.62	0.68	0.77							
Parkersburg, W. Va	13–14			0.92														0.27			
Pensacola, Fla	22	3:05 p. m.	8:20 p. m.	1.38	3:39 p. m.	4:18 p. m.	0.08	0.12	0.25	0.59	0.90	0.96	0.98	1.05	1.11						
Do	28	12:25 p. m.	6:25 p. m.	2.23	2:04 p. m.	3:24 p. m.	0.33	0.06	0.12	0.16	0.26	0.37	0.45	0.49	0.49	0.58	0.78	0.99	1.71		
Peoria, Ill	22–23			1.09														*			
Philadelphia, Pa	23			1.62														0.57			

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
Pittsburg, Pa.	13-14			1.08														*			
Portland, Me	23	10:10 a. m.	10:45 p. m.	1.65	1:34 p. m.	2:08 p. m.	0.58	0.06	0.18	0.32	0.50	0.62	0.69	0.75							
Portland, Oreg	25			1.23														0.24			
Pueblo, Colo.	11			0.06														*			
Raleigh, N. C	22-23	9:30 p. m.	8:45 a. m.	2.13	5:00 a. m.	5:32 a. m.	0.52	0.08	0.28	0.67	0.94	1.13	1.46	1.59							
Richmond, Va	23			1.18														0.48			
Rochester, N. Y.	23			1.22														*			
Sacramento, Cal	10			0.86														0.24			
St. Louis, Mo	22-23			1.13														*			
St. Paul, Minn	26			0.18														0.10			
Salt Lake City, Utah	10-11			0.78														*			
San Antonio, Tex	5-6			0.38						0.09											
San Diego, Cal.	10			0.12									0.10								
Sandusky, Ohio	22-23			0.93														*			
San Francisco, Cal	6			0.30														0.22			
Savannah, Ga	13-14			1.76														0.59			
Scranton, Pa	23			0.60														0.20			
Seattle, Wash	25			0.83														0.23			
Shreveport, La	21	6:15 p. m.	11:05 p. m.	1.12	7:02 p. m.	7:24 p. m.	0.07	0.14	0.36	0.57	0.64	0.69									
Spokane, Wash	25			0.75														*			
Springfield, Ill	9			0.49					0.35												
Springfield, Mo	22-23			0.70														*			
Syracuse, N. Y	23			1.01														*			
Tampa, Fla	10	D. N.	5:00 a. m.	3.75	3:24 a. m.	4:24 a. m.	0.80	0.39	0.69	0.89	1.00	1.22	1.33	1.47	1.52	1.52	1.62	1.98			
Do	13	7:12 p. m.	10:00 p. m.	1.77	7:16 p. m.	7:41 p. m.	T.	0.40	0.82	0.94	1.01	1.09									
Taylor, Tex.	12			0.59														0.33			
Thomasville, Ga.	13	6:08 a. m.	8:54 p. m.	3.13	10:27 a. m.	11:27 a. m.	0.63	0.07	0.16	0.32	0.58	0.67	0.84	0.92	1.02	1.08	1.13	1.27			
Toledo, Ohio	27-28			0.99														*			
Topeka, Kans	17			0.29														*			
Valentine, Nebr.	28-29			0.35														*			
Vicksburg, Miss	29	5:12 p. m.	9:50 p. m.	1.06	6:41 p. m.	7:04 p. m.	0.18	0.19	0.31	0.59	0.62	0.70									
Washington, D. C	9-10			1.00														0.42			
Wichita, Kans	21-22			0.72														0.15			
Wytheville, Va.	13-14			0.98														*			
Yankton, S. Dak	29-30			0.60														*			
San Juan, P. R.	4			0.61														0.45			

*Self-register not working. † No precipitation during the month.

TABLE V.—*Data furnished by the Canadian Meteorological Service, December, 1907.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure. Sea level, reduced to mean of 24 hours.	Pressure. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
St. Johns, N. F										
Sydney, C. B. I.	29.83	29.87	−.02	33.6	+ 5.4	39.4	27.9	5.44	+0.81	11.0
Halifax, N. S.	29.79	29.90	−.06	32.9	+ 5.3	39.6	26.1	6.72	+1.60	13.4
Grand Manan, N. B	29.83	29.88	−.10	34.8	+ 6.5	40.7	28.9	5.80	+1.38	5.0
Yarmouth, N. S	29.87	29.94	−.04	34.4	+ 3.7	39.9	28.9	4.49	−0.55	14.5
Charlottetown, P. E. I	29.79	29.83	−.11	30.1	+ 5.8	35.9	24.4	4.01	+0.35	15.1
Chatham, N. B	29.83	29.85	−.09	25.8	+ 8.8	33.8	17.8	3.00	−0.22	12.9
Father Point, Que.	29.83	29.86	−.09	21.9	+ 6.5	28.6	15.1	2.95	+0.12	20.1
Quebec, Que.	29.50	29.93	−.08	21.9	+ 6.7	28.0	15.9	4.02	+0.33	21.0
Montreal, Que.	29.71	29.93	−.10	24.6	+ 6.3	30.4	18.8	5.08	+1.43	31.2
Rockliffe, Ont.										
Ottawa, Ont	29.65	29.99	−.03	23.2	+ 6.2	28.7	17.7	4.74	+1.83	37.7
Kingston, Ont.	29.65	29.97	−.07	27.4	+ 3.7	33.8	21.0	2.65	−0.59	14.1
Toronto, Ont	29.60	30.00	−.05	29.5	+ 2.5	34.9	24.1	4.69	+1.78	19.9
White River, Ont										
Port Stanley, Ont	29.33	29.99	−.08	29.0	+ 0.6	34.7	23.2	3.87	+1.45	12.3
Southampton, Ont.	29.21			29.8	+ 3.1	35.1	24.5	3.48	−0.50	31.3

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure. Sea level, reduced to mean of 24 hours.	Pressure. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
Parry Sound, Ont	29.22	29.95	−.06	24.0	+ 2.8	31.4	16.5	4.91	+0.43	41.0
Port Arthur, Ont.	29.24	29.97	−.02	17.4	+ 4.2	27.2	7.5	0.02	−0.85	0.2
Winnipeg, Man	29.10	29.97	−.05	14.2	+10.2	23.3	5.1	0.18	−0.73	1.8
Minnedosa, Man	28.04	29.93	−.09	13.4	+ 7.7	23.3	3.5	0.26	−0.36	2.6
Regina, Sask	27.83			15.8	+ 8.4	26.7	5.0	0.77	+0.25	7.7
Medicine Hat, Alberta.	27.51	29.84	−.13	25.6	+ 7.4	36.2	15.0	0.15	−0.40	1.5
Swift Current, Sask.	27.27	29.94	−.05	20.0	+ 4.0	29.8	10.3	1.17	+0.39	11.7
Calgary, Alberta	26.22	29.86	−.08	23.6	+ 5.4	34.4	12.9	0.10	−0.49	1.0
Banff, Alberta	25.20	29.96	+.02	20.0	+ 0.9	26.8	13.1	1.11	−0.10	11.1
Edmonton, Alberta.	27.47	29.83	−.10	20.1	+ 7.0	28.3	11.9	0.56	−0.14	5.6
Prince Albert, Sask.										
Battleford, Sask.	28.08	29.89	−.10	12.7	+ 7.3	22.0	3.3	0.40	+0.08	3.9
Kamloops, B. C.	28.59	29.83	−.11	31.9	+ 3.0	37.0	26.8	0.50	−0.28	
Victoria, B. C.	29.79	29.89	−.08	42.6	+ 1.4	46.0	39.1	4.78	−3.20	
Barkerville, B. C.										
Hamilton, Bermuda	30.01	30.18	+.06	65.7	+ 1.0	70.9	60.6	5.48	+0.99	
Dawson, Yukon										

TABLE VI.—*Heights of rivers referred to zeros of gages, December, 1907.*

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Republican River.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Clay Center, Kans. (5)	42	18	5.8	12-17,30	5.5	24-27	5.7	0.3
Smoky Hill-Kansas River.								
Abilene, Kans	254	22	1.0	24	0.0	3,9,18,29	0.3	1.0
Manhattan, Kans	160	18	3.1	10,13	2.6	19-21	2.9	0.5
Topeka, Kans	87	21	7.3	21	5.2	1-4	5.6	2.1
Missouri River.								
Bismarck, N. Dak.	1,309	14	4.9	2	2.2	1	3.4	2.7
Pierre, S. Dak. (10)	1,114	14	0.6	3	− 0.5	8,21	0.0	1.1
Sioux City, Iowa	784	17	5.7	3-6	2.4	25	4.4	3.3
Blair, Nebr.	705	15	4.9	7,8	2.4	27,30	3.9	2.5
St. Joseph, Mo	481	10	0.9	11	− 1.6	27,28,31	−0.2	2.5
Kansas City, Mo.	388	21	7.0	13,14	4.3	30	6.0	2.7
Glasgow, Mo.	231	18	5.1	1	3.3	31	4.4	1.8
Boonville, Mo.	199	20	7.6	16	5.8	31	7.0	1.8
Hermann, Mo.	103	24	5.7	1,2	4.9	28,29	5.3	0.8

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Minnesota River.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Mankato, Minn	127	18	2.2	1	1.6	28-30	1.9	0.6
St. Croix River.								
Stillwater, Minn. (29)	23	11	3.5	1,2				
Illinois River.								
La Salle, Ill.	197	18	21.5	31	13.5	7	15.8	8.0
Peoria, Ill.	135	14	13.8	31	10.2	8	11.1	3.6
Conemaugh River.								
Johnstown, Pa.	64	7	8.0	24	1.2	6-8	2.8	6.8
Allegheny River.								
Warren, Pa.	177	14	7.8	24	1.2	7-10	3.2	6.6
Parker, Pa.	73	20	9.6	24	1.3	8,9	3.8	8.3
Freeport, Pa.	29	20	17.4	24	3.0	8	7.2	14.4
Youghiogheny River.								
Confluence, Pa. (9)	59	10	6.5	24	1.6	3	2.9	4.9
West Newton, Pa.	15	23	10.4	24	1.4	9	3.8	9.0

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Monongahela River.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Fairmont, W. Va.	119	25	20.1	15	14.7	8	16.4	5.4
Greensboro, Pa.	81	18	15.3	11	7.5	7-9	9.7	7.8
Lock No. 4, Pa.	40	28	19.0	12	8.0	7-9	12.0	11.0
Muskingum River.								
Zanesville, Ohio	70	25	15.3	25	8.0	1-10, 12, 13	9.6	7.3
Little Kanawha River.								
Creston, W. Va.	38	20	14.0	15	2.7	4-10	4.8	11.3
New-Great Kanawha River.								
Hinton, W. Va.	153	14	8.0	24	1.8	8	3.5	6.2
Charleston, W. Va.	58	30	13.5	25	4.9	3	7.4	8.6
Scioto River.								
Columbus, Ohio	110	17	7.0	31	1.9	1	3.5	5.1
Licking River.								
Falmouth, Ky.	30	25	12.4	23	1.1	13	3.5	11.3
Kentucky River.								
Beattyville, Ky	254	30	2.6	16	0.3	8	1.3	2.3
Frankfort, Ky.	65	31	10.6	24	5.8	9	7.0	4.8
Wabash River.								
Terre Haute, Ind.	171	16	15.6	31	0.5	8, 9	4.1	15.1
Mount Carmel, Ill.	75	15	14.6	31	2.3	9-11	6.5	12.3
Cumberland River.								
Burnside, Ky.	518	50	19.0	31	1.5	15, 16	4.1	17.5
Celina, Tenn.	383	45	12.6	25	2.8	11-13	5.9	9.8
Carthage, Tenn.	308	40	11.3	26	2.5	13	5.5	8.8
Nashville, Tenn.	193	40	16.4	26	8.8	9, 10, 13	11.2	7.6
Clarksville, Tenn.	126	43	19.4	27	4.7	12	9.9	14.7
Clinch River.								
Speers Ferry, Va.	156	20	8.0	31	0.1	9	1.5	7.9
Clinton, Tenn	52	25	17.5	31	5.0	10, 12	6.9	12.5
South Fork Holston River.								
Bluff City, Tenn.	35	12	4.8	31	1.2	8, 9	2.1	3.6
Holston River.								
Rogersville, Tenn.	103	14	6.5	31	2.2	8, 9	3.1	4.3
French Broad River.								
Asheville, N. C.	144	4	5.5	24	− 0.3	6-8	0.9	3.8
Dandridge, Tenn.	46	12	5.5	31	0.9	7-9	1.9	4.6
Tennessee River.								
Knoxville, Tenn.	635	12	10.3	31	1.4	8-10	3.2	8.9
Loudon, Tenn	590	25	8.8	31	1.8	9	3.3	7.0
Kingston, Tenn	556	25	12.2	31	2.8	9	4.4	9.4
Chattanooga, Tenn.	452	33	14.6	31	3.5	9, 10	5.9	11.1
Bridgeport, Ala	402	24	9.7	31	2.2	9, 10	4.4	7.5
Guntersville, Ala.	349	31	11.0	31	4.6	11	7.5	6.4
Florence, Ala.	255	16	8.0	31	2.3	10	4.4	5.7
Riverton, Ala.	225	26	12.5	31	4.2	9	7.3	8.3
Johnsonville, Tenn.	95	21	12.5	1	4.6	12	7.3	7.9
Ohio River.								
Pittsburg, Pa.	966	22	18.7	24	3.1	22	7.8	15.6
Dam No. 2, Pa.	956	25	18.3	25	2.5	8	7.7	15.8
Beaver Dam, Pa.	925	27	26.4	25	4.2	8	11.0	22.2
Wheeling, W. Va.	875	36	26.0	25	4.1	9	10.8	21.9
Parkersburg, W. Va.	785	36	25.3	26	5.4	10, 11	11.7	19.9
Point Pleasant, W. Va.	703	39	28.1	27	4.5	10	13.5	23.6
Huntington, W. Va	660	50	30.5	28	7.8	10	17.0	22.7
Catlettsburg, Ky.	651	50	31.5	27	6.6	10	16.8	24.9
Portsmouth, Ohio	612	50	32.0	28	7.4	11	17.4	24.6
Maysville, Ky.	559	50	31.0	28	7.8	12	17.2	23.2
Cincinnati, Ohio.	499	50	32.8	29	10.2	13	19.5	22.6
Madison, Ind	413	46	26.8	30	8.7	13	16.6	18.1
Louisville, Ky.	367	28	11.2	30, 31	4.4	13, 14	7.5	6.8
Evansville, Ind.	184	35	24.0	31	7.8	14	15.1	16.2
Mount Vernon, Ind.	148	35	23.1	31	7.9	14, 15	14.1	15.2
Paducah, Ky.	47	40	20.6	28, 29	7.6	13-15	13.5	13.0
Cairo, Ill.	1	45	24.5	29	11.8	14	17.7	12.7
Neosho River.								
Iola, Kans.	262	10	0.9	23-25	0.1	1, 11, 12	0.4	0.8
Oswego, Kans.	184	20	3.8	26	0.3	3-12	1.3	3.5
Fort Gibson, Okla	3	22	12.2	26	8.7	12, 13	9.4	3.5
Canadian River.								
Calvin, Okla	99	10	4.0	29	2.9	11, 12	3.4	1.1
Black River.								
Blackrock, Ark.	67	12	6.0	24	2.5	18-22	3.6	3.5
White River.								
Calicorock, Ark	272	18	1.0	28	− 0.5	13	0.0	1.5
Batesville, Ark.	217	18	2.8	27-29	1.4	18-20	2.0	1.4
Clarendon, Ark.	75	30	15.5	30, 31	9.2	20, 21	11.7	6.3
Arkansas River.								
Wichita, Kans.	832	10	− 0.2	19	− 2.0	4-6, 21	−1.6	1.8
Tulsa, Okla.	551	16	5.6	26	2.7	10-13	3.4	2.9
Webbers Falls, Okla.	465	23	7.8	27, 28	4.4	8-17	5.3	3.4
Fort Smith, Ark.	403	22	8.5	29	2.1	6-13	3.4	6.4
Dardanelle, Ark.	256	21	7.3	30	2.0	11	3.2	5.3
Little Rock, Ark.	176	23	8.4	31	2.4	17	4.1	6.0
Pine Bluff, Ark.	121	25	10.7	31	4.8	17, 18, 20, 21	6.3	5.9
Yazoo River.								
Greenwood, Miss	175	38	9.2	31	2.7	8	4.6	6.5
Yazoo City, Miss.	80	25	3.0	31	− 0.4	9	1.0	3.4
Ouachita River.								
Camden, Ark.	304	39	22.2	27	5.2	16-18	10.2	17.0
Monroe, La	122	40	16.7	6-9	7.6	21, 22	13.3	9.1
Red River.								
Denison, Tex.	768	22	5.6	22	0.9	20	2.2	4.7
Arthur City, Tex (8).	688	27	16.0	23	7.4	11	9.6	8.6
Fulton, Ark.	515	28	22.8	25	7.8	13, 14	13.2	15.0
Shreveport, La.	327	29	14.4	27	4.0	15-17	7.3	10.4
Alexandria, La.	118	33	19.3	30, 31	7.8	19	11.1	11.5
Mississippi River.								
Fort Ripley, Minn. (25)	2,082	10	7.0	7	4.3	1.2	......	2.7
St. Paul, Minn. (18)	1,954	14	3.0	24	1.3	7	......	1.7
Red Wing, Minn. (8)	1,914	14	1.7	19	0.8	9-11	1.2	0.9
Reeds Landing, Minn. (13)	1,884	12	1.7	1	0.1	30, 31	0.8	1.6
La Crosse, Wis.	1,819	12	3.0	1-3	1.8	27, 28	2.2	1.2
Mississippi River—Cont'd.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Prairie du Chien, Wis. (20)	1,759	18	3.4	1	3.0	3-5	......	0.4
Dubuque, Iowa	1,699	18	3.6	1	1.6	23-25	2.6	2.0
Leclaire, Iowa	1,609	10	1.6	1	0.4	24-26	1.0	1.2
Davenport, Iowa	1,593	15	3.4	1-3	1.8	22, 23, 26	2.6	1.6
Muscatine, Iowa	1,562	16	4.3	1	2.6	25-27	3.3	1.7
Galland, Iowa	1,472	8	1.9	1-3	0.8	24, 25	1.4	1.1
Keokuk, Iowa	1,463	15	2.9	1-3	1.1	27, 28	1.9	1.8
Warsaw, Ill.	1,458	18	5.9	1	4.0	26	4.8	1.9
Hannibal, Mo	1,402	13	3.5	1, 2	1.9	29-31	2.7	1.6
Grafton, Ill	1,306	23	6.1	1, 2	5.2	23, 30, 31	5.6	0.9
St. Louis, Mo	1,264	30	5.9	1	4.3	29, 30	4.9	1.6
Chester, Ill	1,189	30	5.1	1, 2	4.1	13-16	4.5	1.0
Cape Girardeau, Mo.	1,128	28	9.4	25, 26, 28, 29	8.0	13, 14	8.8	1.4
New Madrid, Mo.	1,003	34	20.1	29, 30	9.6	15	14.3	10.5
Luxora, Ark	905	33	13.0	31	3.5	16	6.8	9.5
Memphis, Tenn	843	33	17.5	31	7.7	16, 17	11.5	9.8
Helena, Ark.	767	42	21.6	30	10.3	17, 18	14.5	11.3
Arkansas City, Ark.	635	42	24.0	31	11.9	19	16.6	12.1
Greenville, Miss.	595	42	19.0	31	9.0	19, 20	12.8	10.0
Vicksburg, Miss.	474	45	18.3	31	8.7	20, 22	12.7	9.6
Natchez, Miss.	373	46	18.5	31	11.2	22-24	14.7	7.3
Baton Rouge, La.	240	35	11.8	31	7.2	25	9.7	4.6
Donaldsonville, La	188	28	8.2	14	5.0	25	6.8	3.2
New Orleans, La.	108	16	6.0	10	4.1	25	5.0	1.9
Atchafalaya River.								
Simmesport, La.	127	33	16.5	31	9.9	23	13.1	6.6
Melville, La.	103	31	20.2	31	14.3	22, 23, 25	17.2	5.9
Hudson River.								
Troy, N. Y	154	14	8.2	12, 13	5.5	6, 7	6.5	2.7
Albany, N. Y.	147	12	11.5	11	2.3	4, 5	4.9	9.2
Delaware River.								
Hancock (E. Branch), N. Y.	287	12	10.4	11	3.3	6	4.8	7.1
Hancock (W. Branch), N. Y.	287	10	10.0	11	3.2	6	5.1	6.8
Port Jervis, N. Y.	215	14	11.4	11	1.1	5-9	3.4	10.3
Phillipsburg, N. J.	146	26	18.2	11	2.8	8-10	5.9	15.4
Trenton, N. J.	92	18	10.3	12	2.5	10	4.7	7.8
North Branch Susquehanna.								
Binghamton, N. Y.	183	16	12.8	11	2.6	6, 8	5.4	10.2
Wilkes-Barre, Pa.	60	17	18.7	25	4.5	7, 8	9.6	14.2
West Branch Susquehanna.								
Williamsport, Pa.	39	20	10.0	25	1.4	6, 7	4.2	8.6
Susquehanna River.								
Harrisburg, Pa.	69	17	11.8	11	2.2	9	5.5	9.6
Shenandoah River.								
Riverton, Va.	58	22	6.4	24	0.6	6-9	2.1	5.8
Potomac River.								
Cumberland, Md.	290	8	6.6	24	2.8	6-9	3.8	3.8
Harpers Ferry, W. Va.	172	18	12.0	25	2.0	6-8	4.9	10.0
James River.								
Lynchburg, Va.	260	18	7.2	24	1.7	8, 9	3.2	5.5
Columbia, Va.	167	18	17.6	23, 25	4.0	8, 9	8.3	13.6
Richmond, Va.	111	10	6.6	26	0.6	8	2.1	6.0
Roanoke River.								
Clarksville, Va	196	12	7.7	15	0.4	5, 7-9	2.4	7.8
Weldon, N. C. (1)	129	30	34.0	16	11.0	2	20.5	23.0
Tar River.								
Greenville, N. C.	21	22	13.5	21	4.9	10	8.5	8.6
Cape Fear River.								
Fayetteville, N. C	112	38	37.2	16	5.1	9	14.6	32.1
Pedee River.								
Cheraw, S. C	149	27	29.1	16	2.1	7-9	11.0	27.0
Smiths Mills, S. C.	51	16	15.0	24	6.1	13	11.6	8.9
Lynch Creek.								
Effingham, S. C.	35	12	8.8	19	4.0	13	6.5	4.8
Black River.								
Kingstree, S. C.	45	12	9.0	25	4.2	14	6.8	4.8
Catawba-Wateree River.								
Mount Holly, N. C.	143	15	7.8	24	1.8	22	2.9	6.0
Catawba, S. C	107	11	15.7	24	1.9	5-8	4.9	13.8
Camden, S. C.	37	24	29.2	25	4.5	9	13.5	24.7
Congaree River.								
Columbia, S. C	52	15	18.7	24	1.0	8	5.3	17.7
Savannah River.								
Calhoun Falls, S. C.	347	15	9.3	31	2.5	8	4.6	6.8
Augusta, Ga.	268	32	28.8	24	7.3	10	13.3	21.5
Oconee River.								
Dublin, Ga	79	30	16.1	28	1.0	10, 11	7.3	15.1
Ocmulgee River.								
Macon, Ga.	203	18	17.1	23	2.3	9	7.3	14.8
Flint River.								
Montezuma, Ga.	152	20	14.0	27	4.3	9	9.0	9.7
Albany, Ga.	90	20	15.8	17	4.1	10	10.6	11.7
Bainbridge, Ga.	29	22	16.9	31	7.0	10	12.6	9.9
Chattahoochee River.								
West Point, Ga	239	20	10.3	24	2.9	6-9	4.8	7.4
Eufaula, Ala	90	40	28.0	31	3.8	7, 9	12.5	24.2
Alaga, Ala. (a)	30	25	26.5	25	5.4	9	14.2	21.1
Coosa River.								
Rome, Ga.	266	30	16.9	31	1.5	7-9	3.7	15.4
Gadsden, Ala.	162	22	10.3	31	2.2	9	5.0	8.1
Lock No. 4, Ala.	113	17	9.6	31	2.0	8, 9	4.6	7.6
Wetumpka, Ala	12	45	23.7	31	5.3	9	11.7	18.4
Alabama River.								
Montgomery, Ala.	323	35	23.0	31	5.1	9	9.9	17.9
Selma, Ala	246	35	25.0	31	4.3	9	12.6	20.7
Black Warrior River.								
Tuscaloosa, Ala.	90	43	24.1	31	6.6	8, 9	11.8	17.5
Tombigbee River.								
Columbus, Miss	316	33	2.0	31	− 2.1	9	−0.7	4.1
Demopolis, Ala.	168	35	19.3	31	1.8	9	7.7	17.5
Pascagoula River.								
Merrill, Miss.	78	20	18.0	25	5.0	9	10.5	13.0

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
	Miles.	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Pearl River.								
Columbia, Miss.	110	14	12.3	1	4.8	9, 20, 21	6.5	7.5
Sabine River.								
Logansport, La.	315	25	22.5	24	17.0	12	20.0	5.5
Neches River.								
Beaumont, Tex.	18*	10	6.0	6, 7	2.8	31	4.4	3.2
Trinity River.								
Dallas, Tex.	320	25	28.9	24	5.1	9	10.6	23.8
Long Lake, Tex.	211	35	40.3	30	12.3	13	27.5	28.0
Liberty, Tex.	20	25	27.4	1, 2	18.7	22	24.0	8.7
Brazos River.								
Waco, Tex.	285	22	14.8	22	4.0	20	5.7	10.8
Hempstead, Tex.	140	40	25.0	24	7.0	11	12.7	18.0
Booth, Tex.	61	39	15.4	1	5.4	8–10	9.6	10.0
Colorado River.								
Austin, Tex.	214	18	2.9	23	1.4	2–4	2.1	1.5
Columbus, Tex.	98	24	18.0	13	7.0	30, 31	9.1	11.0
Red River of the North.								
Moorhead, Minn. (29)	284	26	7.9	1	7.4	5	......	0.5
Snake River.								
Lewiston, Idaho	144	24	3.1	28	1.5	20, 21	2.2	1.6
Columbia River.								
Wenatchee, Wash.	473	40	5.9	1–3	5.0	31	5.5	0.9
Umatilla, Oreg.	270	25	2.7	1	1.7	23	2.8	1.0
The Dalles, Oreg.	166	40	6.0	26	1.9	21	3.1	4.1
Willamette River.								
Albany, Oreg.	118	20	28.0	27, 28	3.2	5, 7, 8	10.1	24.8
Portland, Oreg.	12	15	17.2	28, 29	3.7	9	8.2	13.5
Sacramento River.								
Red Bluff, Cal.	265	23	14.0	26	1.0	1	3.3	13.0
Colusa, Cal.	156	28	21.3	28	3.7	1–5	7.3	17.6
Knights Landing, Cal.	99	18	12.5	29	2.6	1–6	5.9	9.9
Sacramento, Cal.	64	25	15.3	29	7.7	1–7	10.3	7.6
San Joaquin River.								
Pollasky, Cal.	203	10	0.6	12	— 0.4	9	—0.1	1.0
Firebaugh, Cal.	148	......	2.3	31	0.2	1–7	1.2	2.1
Lathrop, Cal.	49	14	4.8	30, 31	1.5	5, 6	2.6	3.3

Figures denote number of days frozen. (*) 1 day missing. (‡) 7 days missing. (§) 10 days missing.

Honolulu, T. H., latitude 21° 19′ north, longitude 157° 30′ west; barometer above sea, 38 feet; gravity correction, —0.057 inch, applied. December, 1907.

Day.	Pressure.* 8 a. m.	Pressure.* 8 p. m.	Air temperature. 8 a. m.	Air temperature. 8 p. m.	Maximum.	Minimum.	Moisture. 8 a. m. Wet.	Moisture. 8 a. m. Relative humidity.	Moisture. 8 p. m. Wet.	Moisture. 8 p. m. Relative humidity.	Wind. 8 a. m. Direction.	Wind. 8 a. m. Velocity.	Wind. 8 p. m. Direction.	Wind. 8 p. m. Velocity.	Precipitation. 8 a. m.	Precipitation. 8 p. m.	Clouds. 8 a. m. Amount.	Clouds. 8 a. m. Kind.	Clouds. 8 a. m. Direction.	Clouds. 8 p. m. Amount.	Clouds. 8 p. m. Kind.	Clouds. 8 p. m. Direction.
1	30.04	30.00	69.5	69.0	77	64	62.2	66	65.0	81	n.	4	w.	2	0.00	0.00	5	Ci.-s.	n.	Few	S.	ne.
2	30.06	30.07	74.5	72.0	78	66	64.5	58	66.0	73	se.	2	ne.	6	0.00	0.00	0	0	0	0	0	0
3	30.11	40.11	77.0	73.0	78	68	66.3	60	67.0	78	n.	1	ne.	4	0.00	0.00	2	Cu.	e.	2	S.	e.
4	30.10	30.08	75.4	73.0	79	72	65.0	57	67.0	73	e.	6	sw.	2	0.00	0.00	5	Cu.	e.	Few	Cu.	ne.
5	30.09	30.00	75.2	72.0	79	69	64.1	54	66.0	73	se.	3	e.	3	0.00	0.00	2	Cu.	e.	0	0	0
6	30.03	29.98	73.5	73.5	79	67	67.0	71	68.0	76	ne.	4	ne.	6	0.00	0.00	Few	Cu.	0	0	0	0
7	30.03	30.05	74.3	74.5	78	69	68.0	72	68.0	72	se.	2	ne.	6	0.00	0.03	4	Ci.-s.	n.	2	S.-cu.	ne.
8	30.04	30.06	74.0	74.5	83	69	69.0	78	70.0	80	s.	1	ne.	1	0.00	0.00	Few	Cu.	0	4	S.-cu.	ne.
9	30.10	30.06	75.0	73.0	80	70	69.6	76	71.0	91	s.	1	n.	2	0.00	T.	1	Cu.	e.	6	Cu.	ne.
10	30.10	30.07	76.0	74.0	81	74	68.2	68	70.0	82	e.	5	ne.	4	0.00	0.00	5	Cu.	se.	3	Cu.	ne.
11	30.13	30.10	75.2	74.0	81	70	68.6	72	67.5	71	ne.	2	n.	9	0.01	0.00	4	A.-s.	s.	6	Cu.	ne.
12	30.09	30.10	76.6	73.5	80	72	67.0	61	67.0	71	ne.	3	ne.	3	0.00	0.00	7	Cu.	ne.	8	Cu.	ne.
13	30.07	30.04	73.7	72.0	79	70	67.6	73	68.0	82	e.	6	ne.	8	T.	0.06	7	Cu.	ne.	10	S.	ne.
14	30.04	29.98	73.8	73.0	79	69	68.2	75	68.0	78	se.	6	e.	3	0.05	T.	8	Cu.	ne.	7	Cu.	ne.
15	30.00	29.98	74.3	73.0	78	68	67.4	70	67.0	73	ne.	2	e.	7	0.00	0.00	3	Cu.	ne.	3	Cu.	ne.
16	30.08	30.02	72.5	73.0	80	68	66.2	72	69.0	82	ne.	5	n.	3	0.00	0.00	8	S.-cu.	ne.	9	Cu.	ne.
17	30.06	30.06	73.0	73.2	79	71	69.0	82	66.0	68	e.	6	e.	3	0.01	0.02	6 3	Cu. N.	e. e.	3	Cu.	ne.
18	30.09	30.04	74.8	72.0	80	69	67.2	67	68.0	82	e.	8	e.	3	0.01	T.	7	Cu.	e.	10	S.	ne.
19	30.02	30.00	75.0	74.0	80	71	68.0	70	68.0	74	ne.	9	n.	3	0.01	T.	4	Cu.	e.	9	Cu.	ne.
20	30.03	29.97	74.0	72.0	79	68	67.0	69	67.5	79	sw.	1	ne.	2	T.	0.00	1	A.-s.	0	Few	S.-cu.	e.
21	30.01	29.91	72.1	73.0	78	70	68.1	82	68.0	78	nw.	2	ne.	2	T.	T.	10	S.	e.	7	Cu.	ne.
22	29.88	29.88	68.5	65.0	76	64	68.1	98	65.0	100	s.	15	sw.	4	0.22	1.38	10	N.	s.	10	N.	s.
23	29.94	29.95	72.8	73.0	79	67	65.3	67	68.0	78	e.	2	e.	4	0.08	0.00	2	Cu.	0	0	0	0
24	30.01	30.00	76.2	75.5	81	75	70.7	76	69.0	72	e.	13	ne.	9	0.00	0.00	4	Cu.	e.	0	0	0
25	30.05	30.02	76.3	73.0	80	72	68.0	65	66.5	71	e.	13	e.	4	0.00	0.00	1 3	Ci.-s. Cu.	0 e.	Few	Cu.	ne.
26	30.03	30.02	74.0	73.0	79	70	67.0	69	67.0	73	e.	12	e.	7	T.	T.	4	Cu.	e.	8	N.	n.
27	30.01	29.94	73.4	73.5	78	69	67.0	72	68.0	76	e.	14	e.	7	0.02	T.	4	Cu.	e.	3	S.	ne.
28	29.99	29.95	73.5	73.0	78	69	66.0	67	68.0	78	e.	12	e.	12	0.01	T.	8	Cu.	e.	4	S.	ne.
29	29.97	29.96	74.6	75.0	78	71	66.6	66	66.0	62	e.	14	e.	15	T.	0.00	4	Cu.	e.	Few	S.	e.
30	29.99	29.99	74.0	73.8	78	70	65.2	62	66.0	66	e.	10	e.	8	0.00	0.00	1 3	Ci.-s. Cu.	0 e.	Few	S.	ne.
31	29.98	29.94	75.2	73.0	77	70	66.0	61	66.0	69	e.	5	ne.	7	0.00	0.09	3	Cu.	ne.	4	S.	ne.
Mean	30.036	30.010	74.1	72.9	79.0	69.4	67.0	69.5	67.5	76.0	e.	6.1	ne., e.	5.1	0.42	1.58	4.5	Cu.	e.	3.8	Cu.	ne.

Observations are made at 8 a.m. and 8 p. m., local standard time, which is that of 157° 30′ west, and is 5h and 30m slower than 75th meridian time. *Pressure values are reduced to sea level and standard gravity.

RAINFALL IN JAMAICA.

Thru the kindness of Mr. Maxwell Hall, meteorologist to the government of Jamaica and now in charge of the meteorological service of that island, we have received the following data:

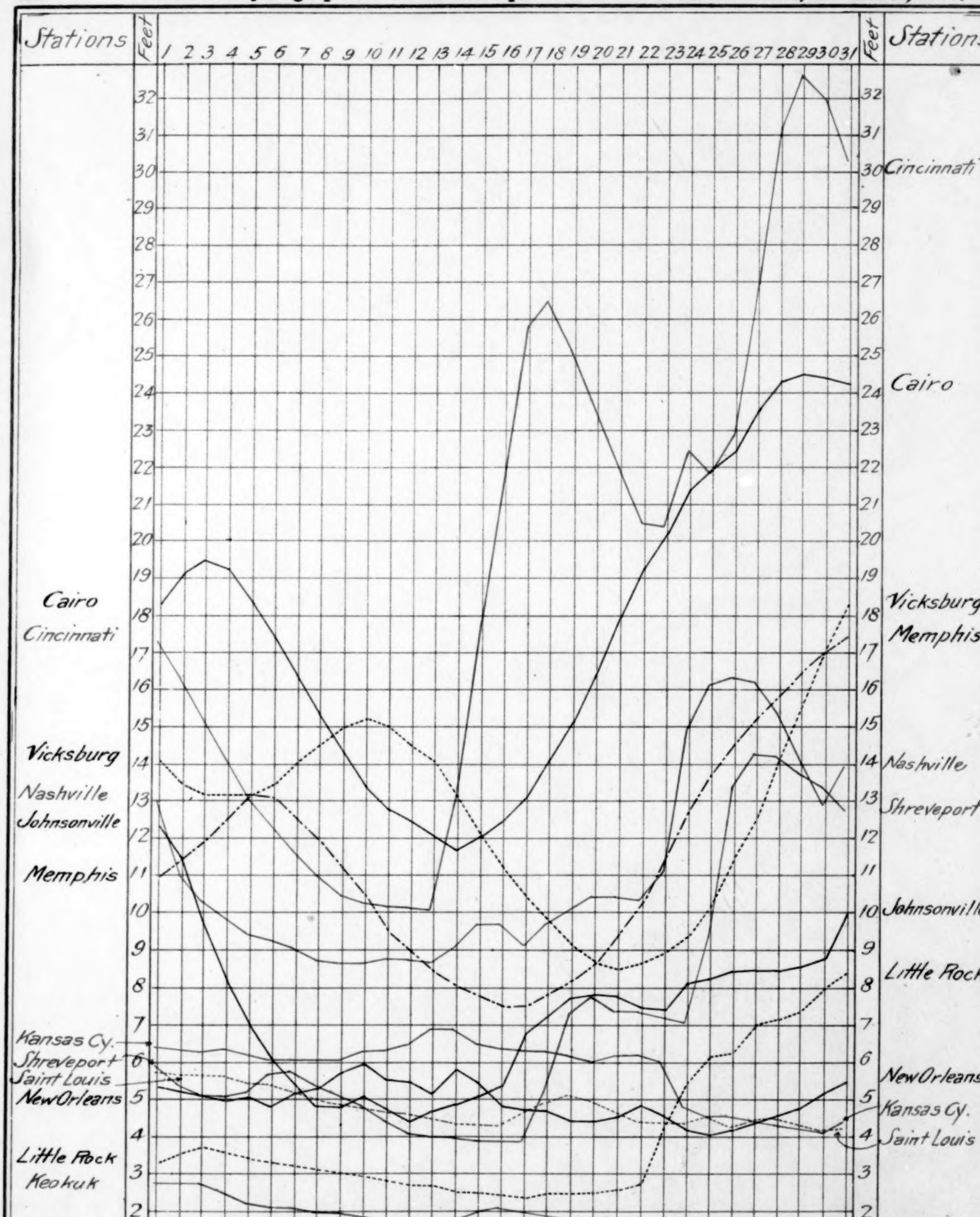
General Summary for the year 1907.

[From about 110 "average" stations.]

Month.	NE.	N.	W. C.	S.	The island.
1907.	*Inches.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
January	5.41	2.70	1.47	0.73	2.58
February	4.71	3.18	3.89	3.21	3.75
March	0.76	0.07	0.21	0.40	0.36
April	0.86	0.62	2.43	1.07	1.24
May	4.78	4.23	5.42	6.05	5.12
June	6.74	3.60	8.55	4.93	5.96
July	5.89	2.34	5.73	3.07	4.26
August	3.65	2.15	7.96	4.75	4.63
September	5.98	4.60	7.19	3.78	5.39
October	13.15	5.96	13.68	9.25	10.51
November	6.20	4.80	3.68	2.35	4.26
December	6.59	3.55	4.32	3.73	4.55
Total	64.72	37.80	64.53	43.32	52.61

With reference to this total fall for the island, it has twice been smaller since 1870, when careful registration was commenced, namely 45.18 in 1872, and 50.09 in 1871; while in 1875 it was 52.42, which is practically the same as in 1907 just past.

Chart I. Hydrographs for Seven Principal Rivers of the United States, December, 1907.



• Barkerville

Chart II. Tracks of Centers of High Areas, December, 1907.

• Barkerville

Chart III. Tracks of Centers of Low Areas, December, 1907.

Chart III. Tracks of Centers of Low Areas, December, 1907.

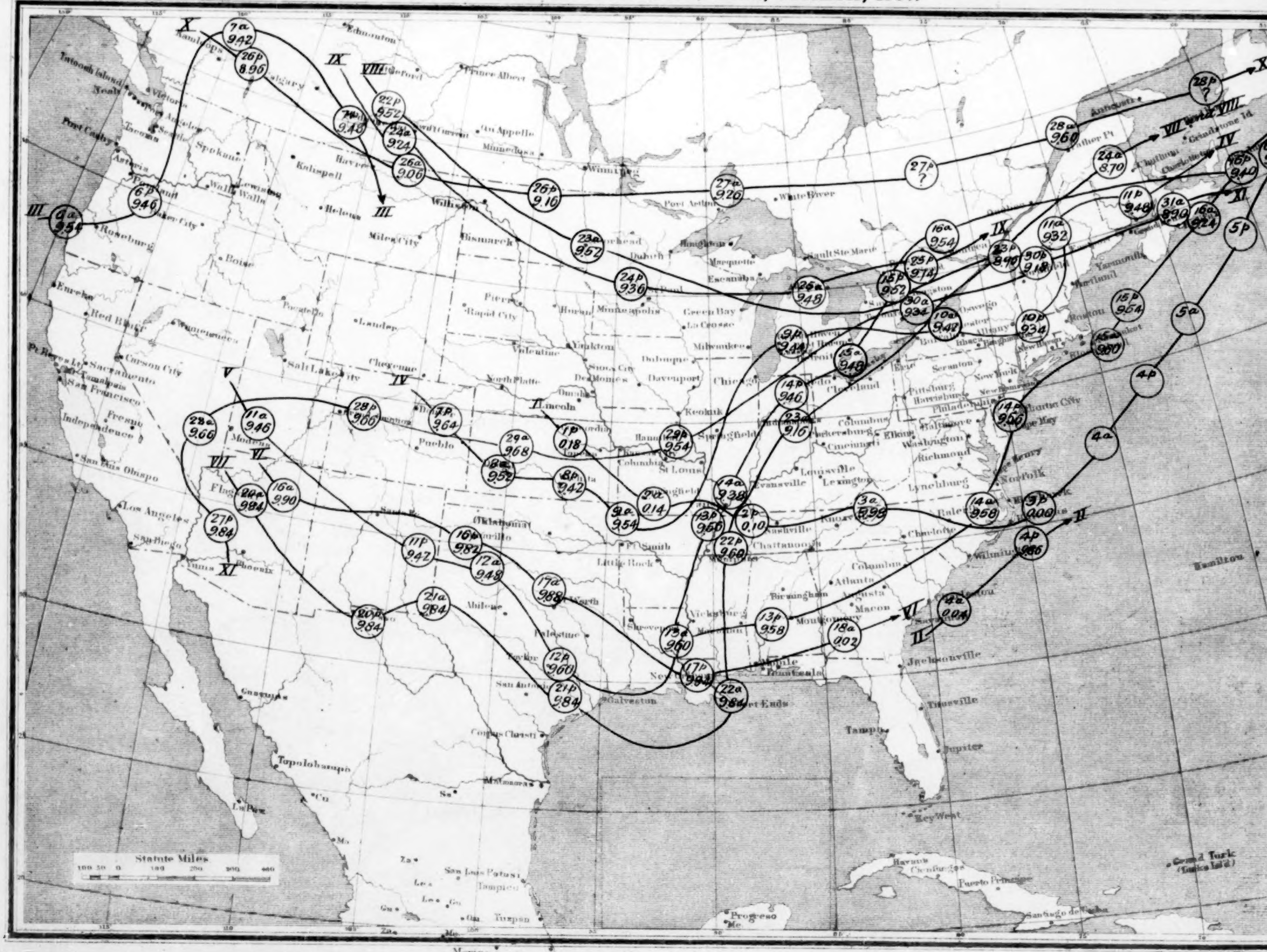


Chart IV. Total Precipitation, December, 1907.

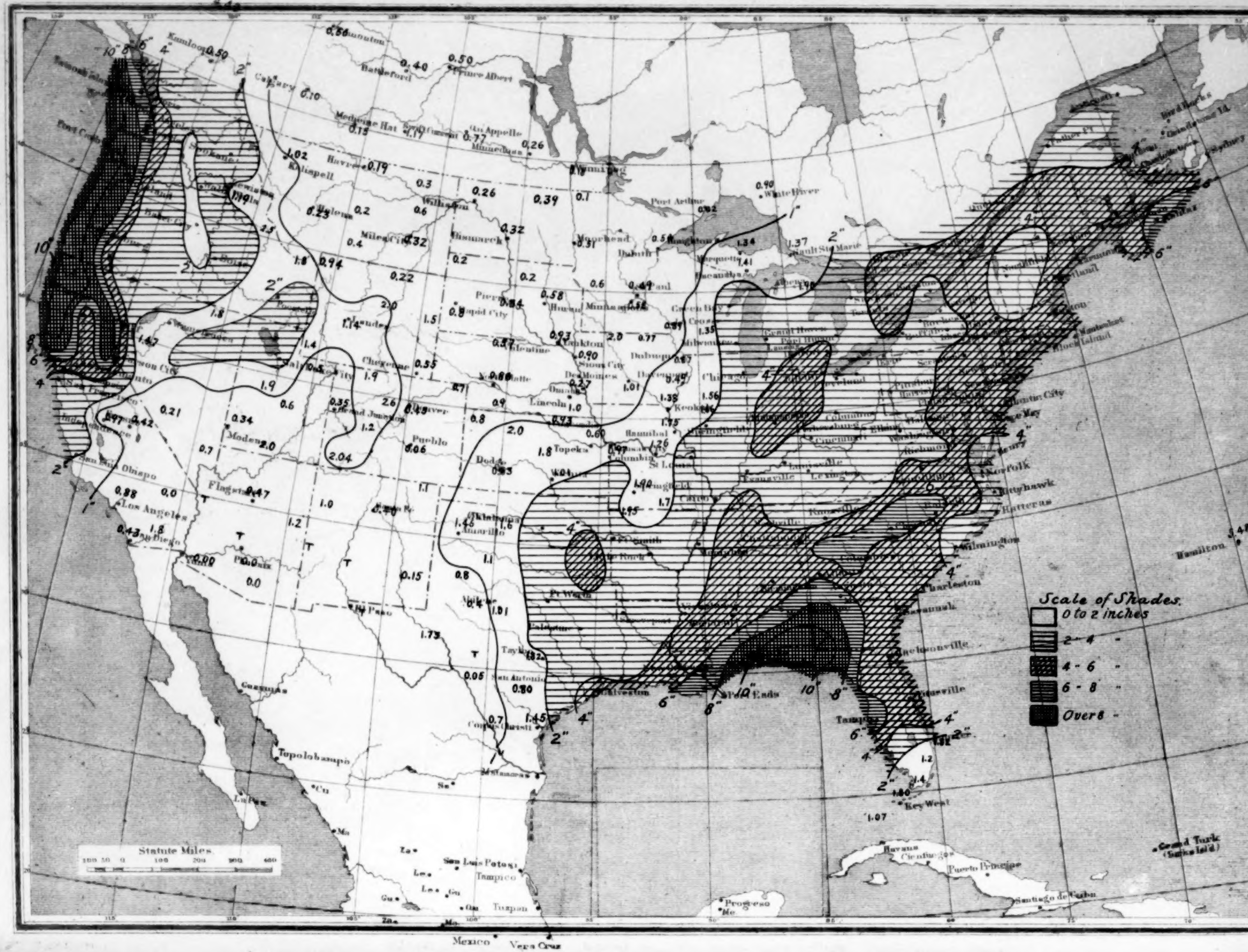


Chart V. Percentage of Clear Sky between Sunrise and Sunset, December, 1907.

Chart V. Percentage of Clear Sky between Sunrise and Sunset, December, 1907.

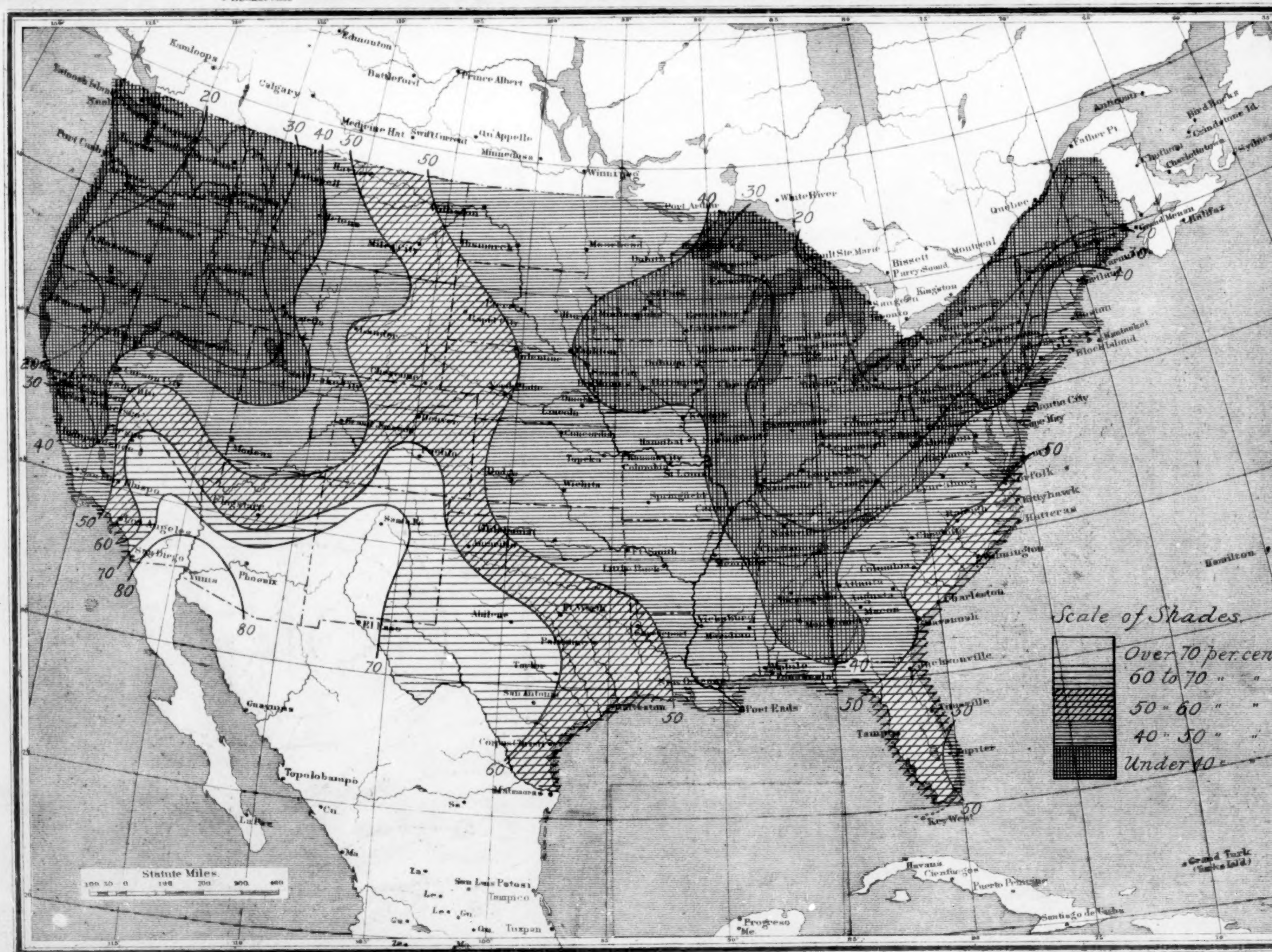


Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, December, 1907.

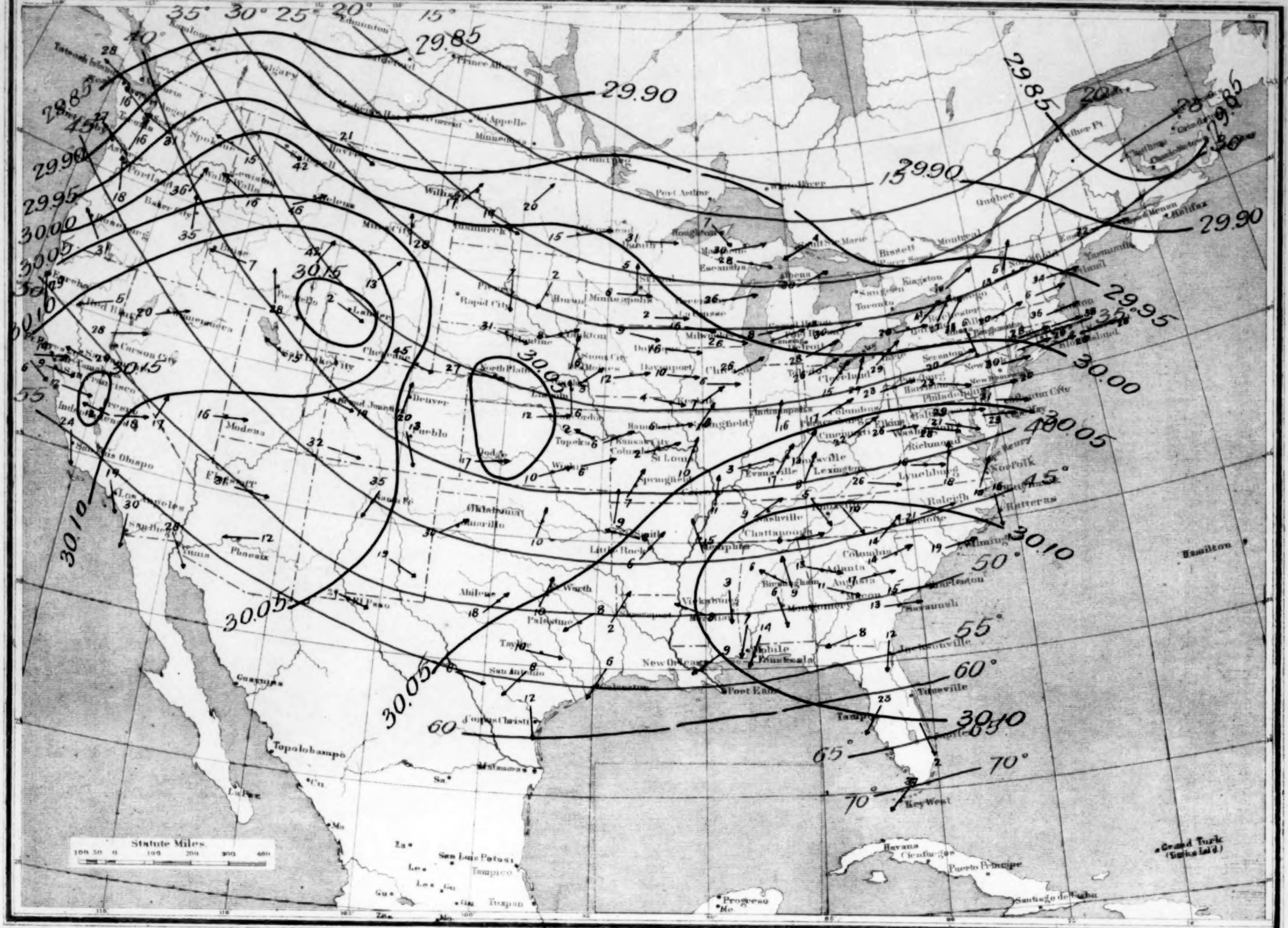


Chart VII. Total Snowfall for December, 1907.

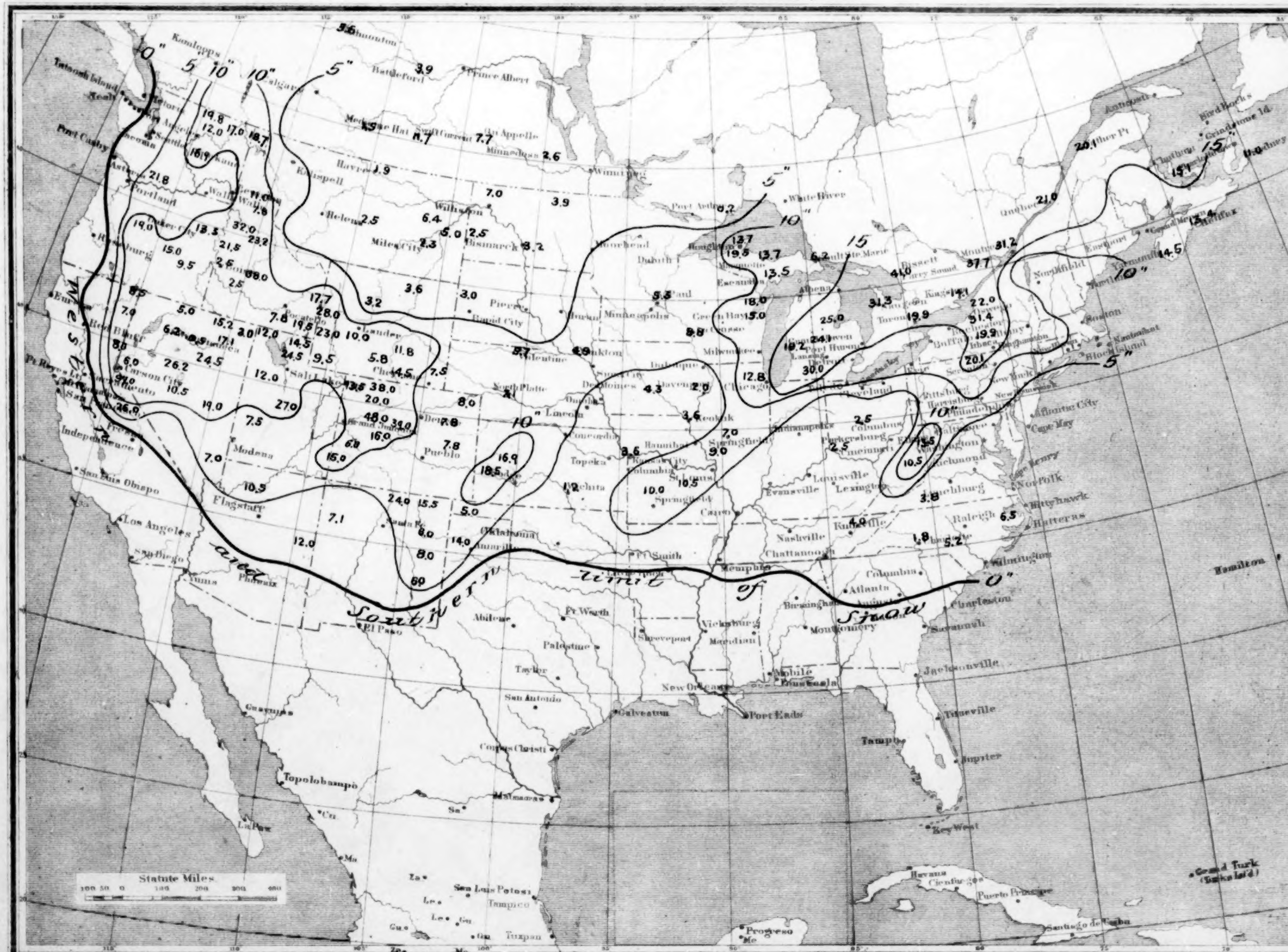
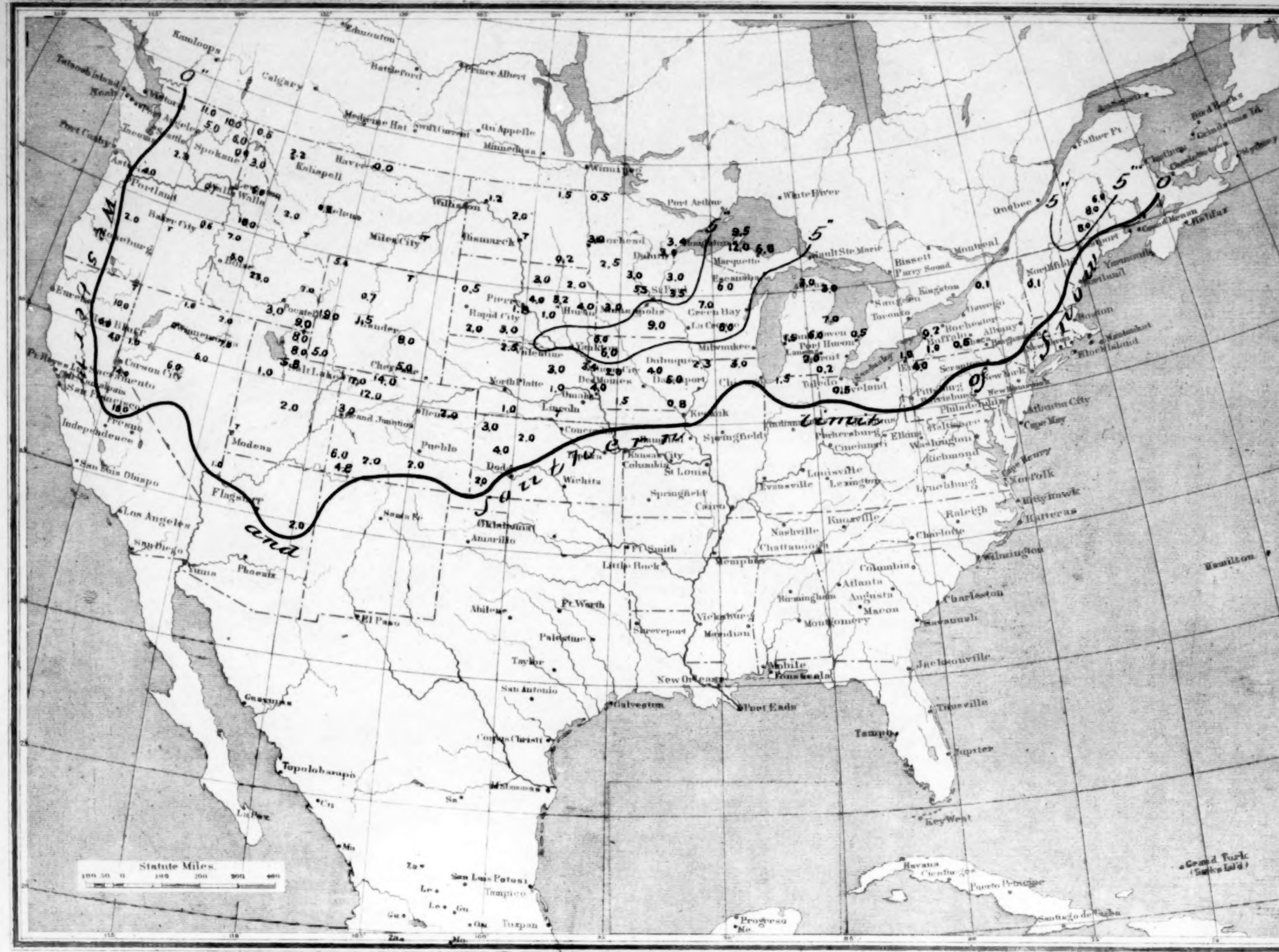


Chart VIII. Depth of Snow on Ground, December 31, 1907.



Polar Map of the Northern Hemisphere.

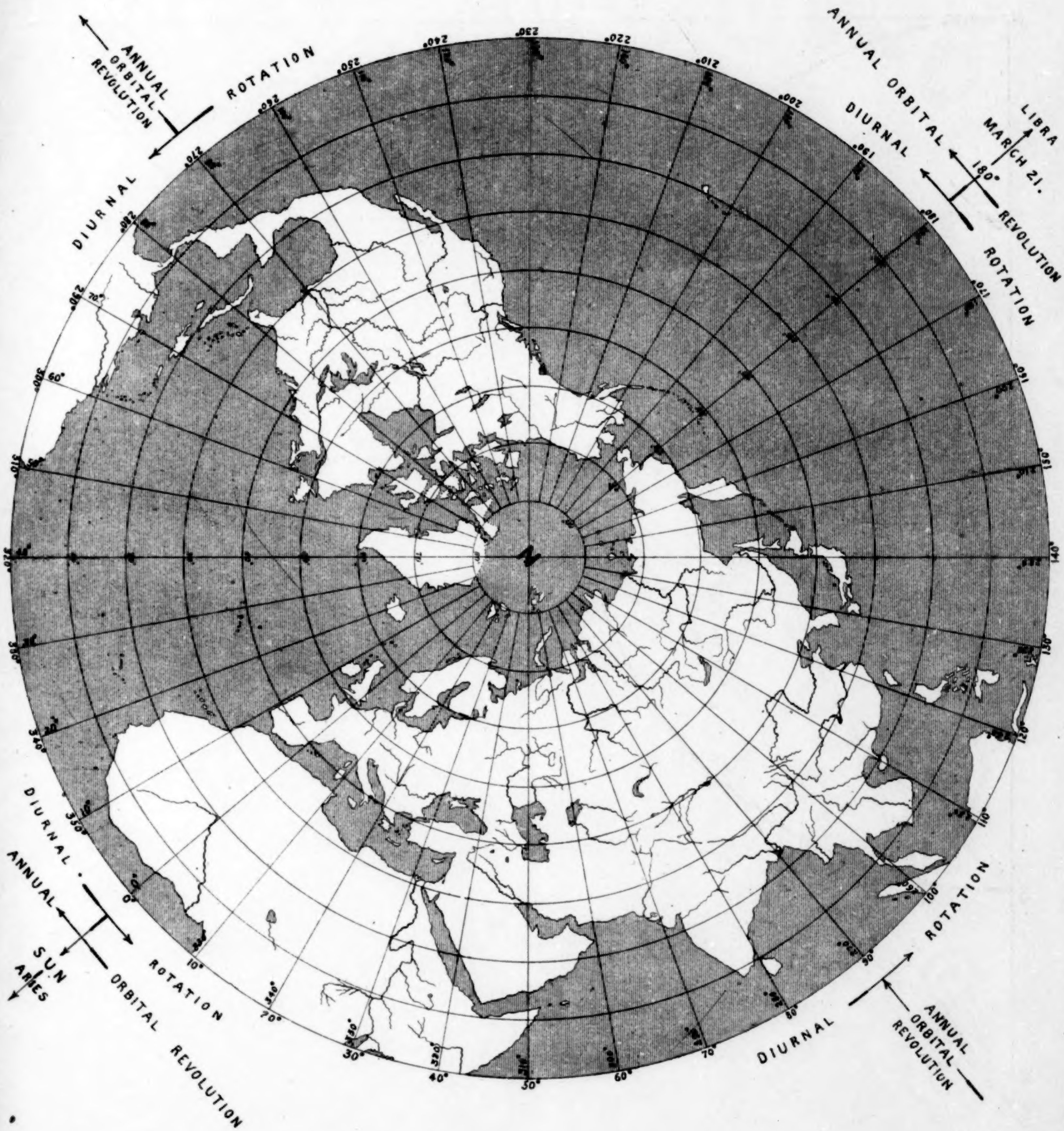
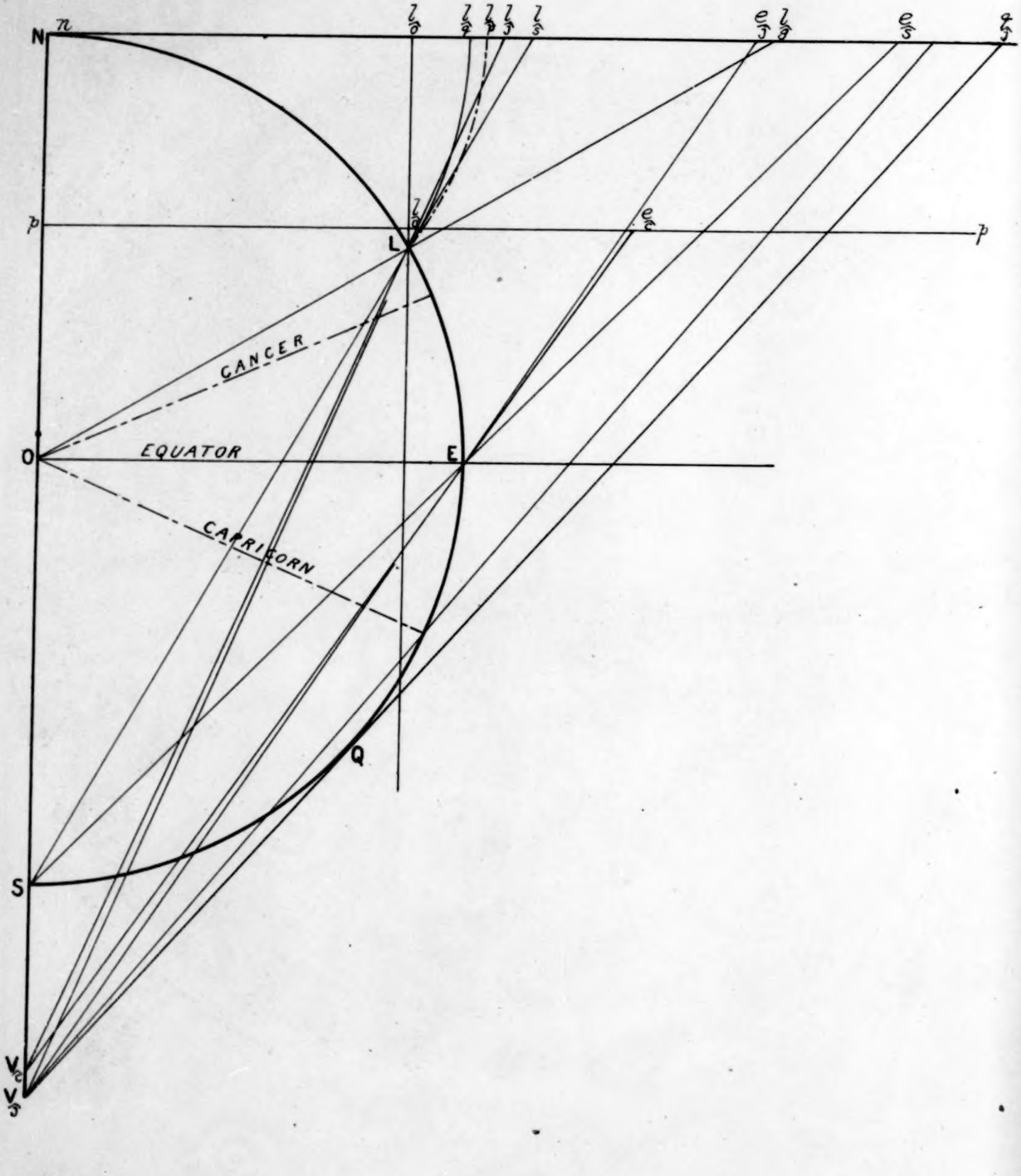


Fig. 1.—Graphic Comparison of Several Projections.



Polar Map of the Southern Hemisphere.

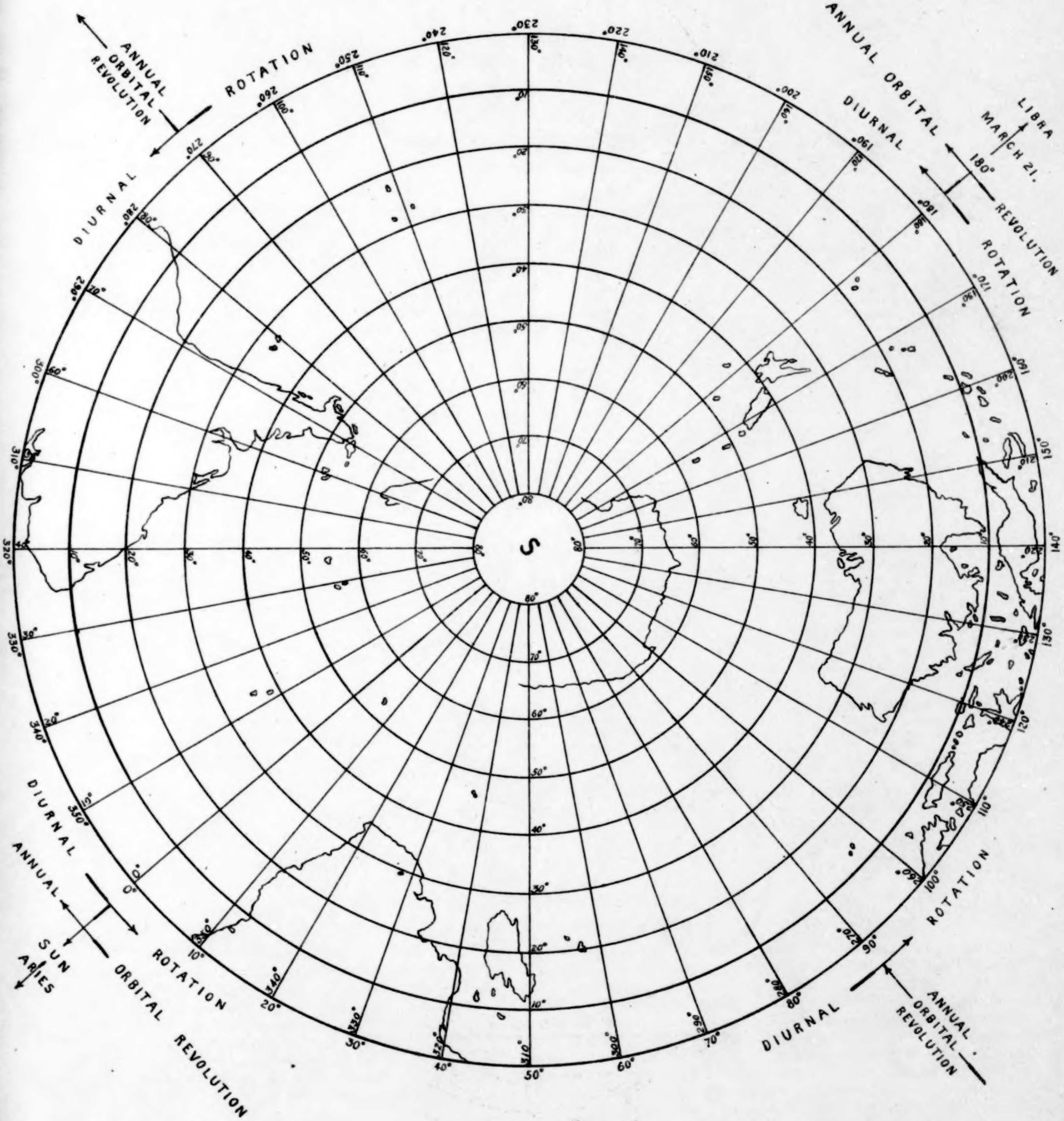


FIG. 2.

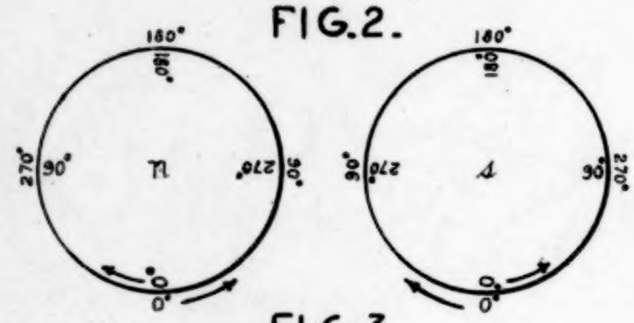


FIG. 3.

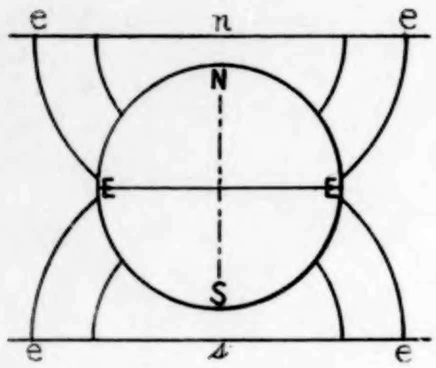


FIG. 4.

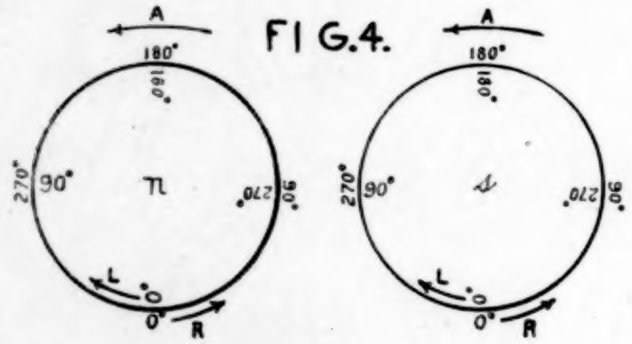


FIG. 5.

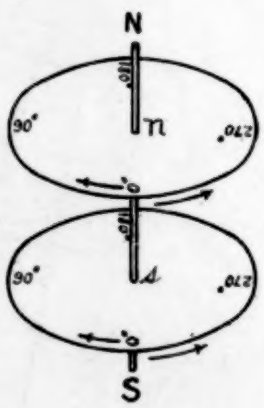


FIG. 6.